Drainage Report for Lift Station 3 Replacement

City of Lacey

April - 2022

Murraysmith

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4/7/2022

I hereby state that this Drainage Control Plan for Lift Station 3 Replacement has been prepared by me or under my supervision and meets the standard of care and expertise which is usual and customary in this community for professional engineers. I understand that the City of Lacey does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities prepared by me.

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Section 1

Proposed Project Description

1.1 Introduction

This is the Drainage Report for the City of Lacey (City) Lift Station Number 3 Replacement Project (Project). The existing Lift Station 3 (LS3) is located in the public right-of-way at the northeast corner of Golf Club Road SE and 26th Avenue SE in Lacey, Washington. The project will relocate LS3 to the property directly east of the existing station, at 4406 SE 26th Avenue, Lacey, Washington. The property is zoned LD 0-4, Low-Density Residential.

It is anticipated that the Stormwater Permit may include discharge from site dewatering efforts during construction as well as permanent stormwater management.

The Project will include the construction of an underground wet well and valve vault, along with drive-through vehicular access, a control building with ADA bathroom, generator and fuel tank, and a 15-foot landscape buffer along the eastern edge of the property.

1.2 Discussion of Core Requirements

The existing site has more than 35 percent of existing impervious condition and is therefore considered a Redevelopment. The project is expected to result in approximately 7,000 square feet (sf) of impervious surface. Per Figure 2.1 and Figure 2.2 in the City's 2016 Stormwater Design Manual (SWDM), this triggers all nine Core Requirements. These flow charts are included in Appendix 3 with clear decision markers. Each Core Requirement and the applicability or addressment for this Project is discussed in the following subsections. The areas of relevant surface types were calculated from the existing conditions survey and the proposed site plan, and are tabulated in Table 1-1, to be referenced when determining individual Core Requirement thresholds. The existing conditions and proposed site plan with area type delineations are attached as Appendix 4.

Table 1-1: Schedule of Surfaces

Surface Type	Area (square feet)
Existing Hard Surface	4,300
Proposed Hard Surface	6,800
Proposed Effective Impervious Surface	6,800

Surface Type	Area (square feet)
Proposed Disturbed Pervious Surface	650

1.2.1 Core Requirement #1 – Preparation of Stormwater Site Plans

A Stormwater Site Plan (SSP) is required for all projects meeting thresholds in Figure 2.1 and Figure 2.2 in the City's 2016 SWDM. For projects triggering all nine Core Requirements, a Drainage Control Plan is the type of SSP necessary. Typical Drainage Control Plan submittal packages include the following components: Drainage Report, Site Development Drawings, Construction Stormwater Pollution Prevention Plan (SWPPP), Soils Report, Maintenance and Source Control Manual, Maintenance Covenant, and plan appendices per the City's SWDM. This report fulfills the Drainage Report requirement; the Site Development Drawings, Construction SWPPP, Soils Report, and Maintenance and Source Control Manual are included as **Attachment 1**, **Attachment 2**, **Attachment 3**, and **Attachment 4**, respectively; no Maintenance Covenant is required for facilities fully owned and operated by the City.

1.2.2 Core Requirement #2 – Construction Stormwater Pollution Prevention

All new development and redevelopment projects are responsible for preventing erosion and discharge of sediment and other pollutants into receiving waters and must comply with Construction SWPPP Elements #1 through #13. Each Element, applicability to the Project, and relevant BMPs are discussed in the Construction SWPPP, included as **Attachment 2** of this Drainage Plan.

1.2.3 Core Requirement #3 – Source Control of Pollution

Source Control BMPs must be selected in accordance with the most recent Ecology Manual. Below is a list of BMPs applicable to all sites and the relevant BMPs for activities which may occur on the Project site. Details for each BMP can be found in the Maintenance and Source Control Manual, **Attachment 4**.

- S410 – Correcting Illicit Discharges to Storm Drains
- S453 – Formation of a Pollution Prevention Team
- S454 – Preventative Maintenance and Good Housekeeping
- S455 – Spill Prevention and Cleanup
- S456 – Employee Training

- S457 – Inspections
- S458 – Record Keeping
- S415 – Maintenance of Public and Private Utility Corridors and Facilities
- S417 – Maintenance of Stormwater Drainage and Treatment Facilities
- S421 – Parking and Storage of Vehicles and Equipment
- S407 – Dust Control at Disturbed Land Areas and Unpaved Roadways and Parking Lots
- S411 – Landscaping, Lawn, and Vegetation Management
- S450 – Irrigation
- S428 – Storage of Liquids in Permanent Aboveground Tanks
- S426 – Spills of Oil and Hazardous Substances

1.2.4 Core Requirement #4 – Preservation of Natural Drainage Systems and Outfalls

This Project proposes to retain the current drainage patterns of the site. The generally flat topography of the site and parcels north and east of the site is such that no account need be made for run-on. The existing drainage consists of sheet flow to one of three stormwater management structures. In the southwest corner of the site is a 36-inch storm drain and is the main stormwater structure near the site. To the southeast of the site a ditch runs parallel before entering a culvert which connects to the City's storm sewer. In the northwest corner of the site is a 10-inch square yard drain, which also connects to the City's storm system. An off-site capacity analysis is not required as the proposed project will not change the location, concentration, or frequency of discharge, as demonstrated in the WWHM2012 Project Report included with Appendix 1.

1.2.5 Core Requirement #5 – On-Site Stormwater Management

Projects triggering Core Requirements #1 through #9 must use the Low Impact Development (LID) Performance Standard and BMP T5.13 or apply List #2. Because this project is qualified as flow control exempt (see Section 1.2.7 below), it does not have to achieve LID performance standard nor consider bioretention, rain gardens, permeable pavement, or full dispersion BMPs when using List #2. This project will implement postconstruction soil quality and depth for all lawn and landscaped areas, downspout infiltration for the roof of the control building, and sheet flow dispersion for all non-roof impervious surfaces. Details for each of these requirements are included with the Site Development Drawings in Attachment 1.

1.2.6 Core Requirement #6 – Runoff Treatment

All impervious surfaces within the project limits have secured access and are only accessed by maintenance crews infrequently. As defined by the City's SWDM, infrequently used maintenance access roads are not considered regularly used surfaces, therefore not considered a significant source of pollutants in stormwater runoff nor a pollution generating impervious surface. Core Requirement #6 is not applied due to the site having zero effective pollution generating impervious area.

1.2.7 Core Requirement #7 – Flow Control

The project does not meet any of the three thresholds for Flow Control. 7,000 square feet of total effective impervious surfaces will be created or replaced by this project, which is less than the 10,000 square feet threshold. The project disturbs 0.22 acres, which is less than the 0.75 acres threshold. Modeling the predeveloped condition and the proposed condition indicates less than 0.15 cubic feet per second (cfs) increase in the 100-year recurrence interval flow frequency. The WWHM2012 Project Report is included with this report as Appendix 1.

1.2.8 Core Requirement #8 – Wetlands Projection

The project does not discharge stormwater to a wetland; therefore, Core Requirement #8 is not applicable.

1.2.9 Core Requirement #9 – Operation and Maintenance

The Maintenance and Source Control Manual, which fulfils Core Requirement #9 is included with this report as Attachment 4.

Section 2

Existing Conditions Description

2.1 Existing Ground Cover

The existing site includes pervious lawn and landscaped area, a paved driveway and walkway, a house, and a shed. The existing ground cover is summarized in Table 2-1 below.

Table 2-1: Existing Ground Cover

Existing Ground Cover Type	Area (Square Feet)
Pervious Lawn and Landscaped Area	5,300
Total Hard Surfaces	4,300
Pollution Generating Hard Surfaces	900

2.2 Stormwater Topography

Due to generally flat local topography and ample storm drains, there does not appear to be significant off-site drainage to the property. There are no historical drainage problems or complaints on record.

The existing drainage consists of sheet flow to one of three stormwater management structures. In the southwest corner of the site is a 36-inch storm drain, this is the main stormwater structure near the site. To the southeast of the site a storm ditch runs parallel before entering a culvert storm drain which connects to the City's storm system. In the northwest corner of the site is a 10-inch square yard drain, which also connects to the City's storm system.

2.3 Geotechnical Assessment

Three general soil units were observed in the two borings: fill, recessional outwash and glacial till.

Fill was on the order of 2 to 10 feet thick. The fill was deeper in B-1 (located north of the existing residence) than at B-2 located near the existing pump station. Fill typically consisted of very loose to medium dense silty sand.

Recessional outwash was observed below the fill and extended to around 45 feet below ground surface. At shallower depths (10 to 35 feet) the recessional outwash consisted of loose to medium dense sand with variable silt content. Below this the recessional outwash was typical dense to very dense and consisted of course sand with gravel.

Underlying the recessional outwash is glacial till which consisted of very dense silty sand and silty gravel.

Groundwater was measured around 9 feet below ground surface in B-1 and 5 feet below ground surface in B-2 at the time of drilling. We installed monitoring wells and pressure transducers in both borings. The pressure transducers will measure groundwater levels daily. We will report back on groundwater levels in a few weeks once we have collected more data

Additional information on existing soil type, groundwater level, and soil hydraulic conductivity are included in the Geotechnical report, see Attachment 3.

2.4 Critical Areas

The local storm system drains generally south from the project site, ultimately discharging to Chambers Lake. The project site is within the Chambers Lake drainage basin, as identified on the basin map included in Appendix 5. The nearby area contains no wetlands, ravines, steep slopes, endangered species habitats, or other environmentally critical or sensitive surface areas. Per City mapping in the 2020 Stormwater Comprehensive Plan, the project site is located within a Category 1 critical aquifer recharge area (CARA) but is not located in a wellhead protection area; these maps are included as Appendix 5. There are no specific basin plans or water quality improvement programs which apply to the project site.

Projects within a Category 1 CARA require enhanced treatment for infiltration from pollution generating surfaces and pollution source control plans for any pollutants stored or used on-site. No pollution generating surfaces exist on the project site, as determined in Section 1.2.6, and the only infiltration is downspout infiltration for the roof of the control building, therefore enhanced treatment is not necessary. The only pollutant stored or used on-site is fuel for the generator, which will be stored in a double walled fuel tank to prevent spills and leaks.

Section 3

Vicinity Analysis and Subbasin Description

3.1 Qualitative Analysis

As discussed in Section 1.2.4 and Section 2, the existing topography is relatively flat and storm drainage infrastructure surrounding this site is robust. The project will not be significantly changing concentration, frequency, or duration of stormwater flows. There are no historical drainage problems or complaints on record.

The drainage system between the site and receiving waters does not pass any emergency services. The receiving waterbody, Chambers Lake, is not currently nor proposed for any water quality monitoring. The confirmation of soil types on the site will determine the CARA status of the site, as discussed in Section 2. According to the Thurston County interactive permitting map, accessed November 2021, the project site is not within any potential flood hazard areas.

The only record of an underground storage tank (UST), according to the Environmental Site Assessment (ESA) performed by Robinson Noble, is the original fuel tank for the LS3 generator. This UST was installed in 1970, then abandoned and removed in 1999. Since removal was completed, there are no further concerns raised by this UST.

3.2 Quantitative Analysis

Qualitative analysis shows no need for quantitative analysis, as there are no projected impacts on upstream or downstream stormwater systems.

Section 4

Flow Control and Water Quality Facility Sizing

4.1 Stormwater Modeling

This project site is flow control exempt and runoff treatment exempt because it does not meet thresholds for either individual Core Requirement, as discussed in Section 1.2.6 and Section 1.2.7. This section summarizes the assumptions and model parameters, which indicate exemption. The full results of the WWHM modeling are included with this report as Appendix 1.

Flow control predevelopment is the lower runoff of the pre project condition or the site in 1997, the effective date of first ordinance to meet Clean Water Act and NPDES permit requirements for flow control. The property is occupied by a single-story, single-family residence which was constructed in 1969. In 2012, the property was improved with the addition of a 200-square foot shed. The shed addition was not included in the pre-developed conditions model.

The site contains only one threshold discharge area (TDA) because all three of the storm drains situated around the site combine less than a quarter mile downstream. The model was therefore created with a single "point of compliance" for the single TDA. The input parameters for both pre-developed and mitigated conditions are summarized in Table 4-1, the model output flow frequencies are summarized in Table 4-1.

Table 4-1: WWHM2012 Input Parameters

Area Type	Predeveloped (acres)	Mitigated (acres)
A/B, Lawn, Flat	0.127	0.064
Roof Tops, Flat	0.046	0.010
Driveways, Flat	0.048	0.147
Total	0.221	0.221

Table 4-2: WWHM2012 Return Period Flow Frequency Output

Return Period	Predeveloped Flow (cfs)	Mitigated Flow (cfs)
2-year	0.044	0.068
5-year	0.066	0.096
10-year	0.084	0.118
25-year	0.112	0.149
50-year	0.137	0.175
100-year	0.165	0.204

This model identifies only approximately 0.039 cfs increase between the predeveloped and mitigated 100-year frequency flow. This is not a significant enough increase to necessitate flow control.

Section 5

Aesthetic Considerations for Facilities

5.1 Landscaping

The project site will include Type 1 landscaping buffer at the eastern and northern edges of the property. Vegetation and spacing will be chosen to meet the applicable section of the City's municipal code section 16.080 Landscaping Requirements.

Section 6

Conveyance System Analysis and Design

6.1 Conventional Conveyance System Analysis

There is no need for conventional conveyance systems on this site. This section is not applicable.

Section 7

Covenants, Dedications, Easements

7.1 Covenants, Dedications, Easements

The project site is owned and operated by the City. No covenants, dedications, or easements are required.

Section 8

Agreements and Guarantees

8.1 Agreements and Guarantees

The project site is owned and operated by the City. No agreements are necessary.

Section 9

Other Permits or Conditions Placed on the Project

9.1 Other Permits

The City is leading the effort to secure all other permits and approvals. City coordination will be completed to confirm all permits are identified and schedules to secure are addressed. Anticipated permits include the following:

- Conditional use permit
- Building permit
- Electrical permit
- Mechanical permit
- Plumbing permit
- Grading permit

Appendix 1

Design Calculations

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	Lift Station 3 Replacement
Site Name:	Lacey LS3
Site Address:	4406 26th Ave SE
City:	Lacey, WA, 98503
Report Date:	11/4/2021
Gage:	Woodland Creek
Data Start:	1955/10/01
Data End:	2011/09/30
Timestep:	15 Minute
Precip Scale:	0.889
Version Date:	2019/09/13
Version:	4.2.17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A B, Lawn, Flat	0.127
Pervious Total	0.127

Impervious Land Use	acre
ROOF TOPS FLAT	0.046
DRIVEWAYS FLAT	0.048
Impervious Total	0.094
Basin Total	0.221

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A B, Lawn, Flat	0.064
Pervious Total	0.064

Impervious Land Use	acre
ROOF TOPS FLAT	0.01
DRIVEWAYS FLAT	0.147
Impervious Total	0.157
Basin Total	0.221

Element Flows To:

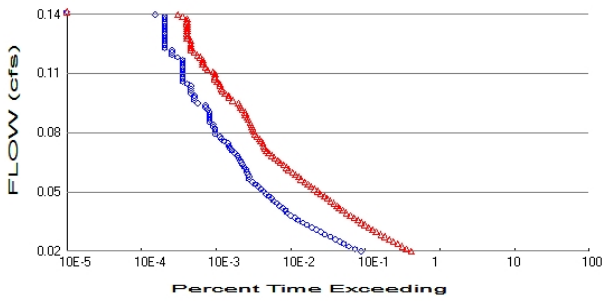
Surface	Interflow	Groundwater

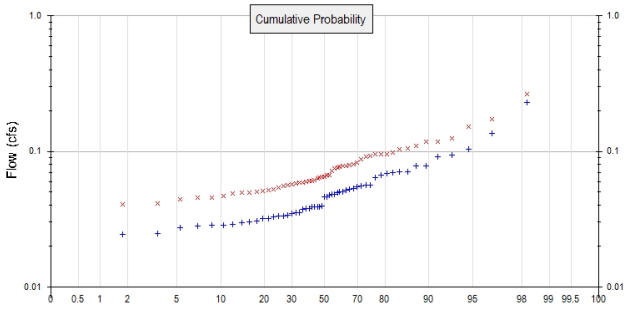
Routing Elements
Predeveloped Routing

Mitigated Routing

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.127
Total Impervious Area: 0.094

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.064
Total Impervious Area: 0.157

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.043657
5 year	0.065818
10 year	0.084181
25 year	0.112187
50 year	0.136952
100 year	0.165435

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.068139
5 year	0.096288
10 year	0.118018
25 year	0.149255
50 year	0.175449
100 year	0.204304

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1956	0.039	0.060
1957	0.078	0.105
1958	0.033	0.052
1959	0.052	0.076
1960	0.046	0.076
1961	0.028	0.044
1962	0.033	0.056
1963	0.093	0.124
1964	0.069	0.095
1965	0.046	0.067

1966	0.029	0.049
1967	0.038	0.056
1968	0.033	0.050
1969	0.028	0.046
1970	0.025	0.041
1971	0.050	0.071
1972	0.048	0.065
1973	0.030	0.050
1974	0.050	0.083
1975	0.057	0.088
1976	0.040	0.063
1977	0.071	0.118
1978	0.057	0.078
1979	0.067	0.095
1980	0.038	0.059
1981	0.071	0.096
1982	0.052	0.080
1983	0.091	0.152
1984	0.039	0.060
1985	0.055	0.093
1986	0.078	0.104
1987	0.048	0.067
1988	0.025	0.041
1989	0.027	0.045
1990	0.050	0.075
1991	0.104	0.118
1992	0.230	0.265
1993	0.048	0.080
1994	0.034	0.057
1995	0.054	0.091
1996	0.053	0.078
1997	0.137	0.173
1998	0.069	0.109
1999	0.039	0.065
2000	0.035	0.059
2001	0.030	0.051
2002	0.035	0.058
2003	0.028	0.047
2004	0.032	0.054
2005	0.023	0.038
2006	0.039	0.064
2007	0.035	0.059
2008	0.031	0.051
2009	0.037	0.062
2010	0.064	0.098
2011	0.032	0.053

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.2304	0.2652
2	0.1367	0.1728
3	0.1042	0.1520
4	0.0934	0.1242
5	0.0911	0.1183
6	0.0784	0.1179
7	0.0776	0.1092
8	0.0710	0.1049

9	0.0706	0.1035
10	0.0693	0.0983
11	0.0691	0.0957
12	0.0668	0.0948
13	0.0642	0.0946
14	0.0566	0.0926
15	0.0565	0.0909
16	0.0554	0.0880
17	0.0544	0.0828
18	0.0529	0.0800
19	0.0522	0.0795
20	0.0519	0.0783
21	0.0504	0.0776
22	0.0499	0.0764
23	0.0497	0.0764
24	0.0482	0.0745
25	0.0480	0.0713
26	0.0476	0.0671
27	0.0465	0.0666
28	0.0459	0.0651
29	0.0398	0.0651
30	0.0391	0.0639
31	0.0391	0.0629
32	0.0389	0.0616
33	0.0387	0.0605
34	0.0379	0.0603
35	0.0376	0.0595
36	0.0374	0.0589
37	0.0353	0.0586
38	0.0351	0.0580
39	0.0347	0.0568
40	0.0340	0.0560
41	0.0333	0.0556
42	0.0333	0.0537
43	0.0330	0.0525
44	0.0321	0.0515
45	0.0319	0.0513
46	0.0307	0.0506
47	0.0303	0.0499
48	0.0299	0.0498
49	0.0291	0.0486
50	0.0284	0.0468
51	0.0284	0.0457
52	0.0282	0.0453
53	0.0271	0.0444
54	0.0248	0.0414
55	0.0245	0.0407
56	0.0228	0.0381

Duration Flows

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0218	1701	8078	474	Fail
0.0230	1427	6986	489	Fail
0.0242	1190	6142	516	Fail
0.0253	1005	5343	531	Fail
0.0265	883	4664	528	Fail
0.0276	773	4084	528	Fail
0.0288	667	3593	538	Fail
0.0300	561	3171	565	Fail
0.0311	495	2757	556	Fail
0.0323	430	2447	569	Fail
0.0335	373	2180	584	Fail
0.0346	322	1935	600	Fail
0.0358	285	1732	607	Fail
0.0369	243	1552	638	Fail
0.0381	223	1383	620	Fail
0.0393	196	1239	632	Fail
0.0404	178	1086	610	Fail
0.0416	167	970	580	Fail
0.0428	153	876	572	Fail
0.0439	139	814	585	Fail
0.0451	129	749	580	Fail
0.0462	117	675	576	Fail
0.0474	108	607	562	Fail
0.0486	99	552	557	Fail
0.0497	92	494	536	Fail
0.0509	85	449	528	Fail
0.0521	78	412	528	Fail
0.0532	72	365	506	Fail
0.0544	66	335	507	Fail
0.0556	60	304	506	Fail
0.0567	55	270	490	Fail
0.0579	54	250	462	Fail
0.0590	53	225	424	Fail
0.0602	51	209	409	Fail
0.0614	50	183	366	Fail
0.0625	47	174	370	Fail
0.0637	44	158	359	Fail
0.0649	43	143	332	Fail
0.0660	41	132	321	Fail
0.0672	39	120	307	Fail
0.0683	38	109	286	Fail
0.0695	35	99	282	Fail
0.0707	32	93	290	Fail
0.0718	30	88	293	Fail
0.0730	29	85	293	Fail
0.0742	28	83	296	Fail
0.0753	25	78	312	Fail
0.0765	23	75	326	Fail
0.0776	22	69	313	Fail
0.0788	19	65	342	Fail
0.0800	19	63	331	Fail
0.0811	19	61	321	Fail
0.0823	18	59	327	Fail
0.0835	18	58	322	Fail

0.0846	16	56	350	Fail
0.0858	16	53	331	Fail
0.0869	16	51	318	Fail
0.0881	16	48	300	Fail
0.0893	16	48	300	Fail
0.0904	15	44	293	Fail
0.0916	14	42	300	Fail
0.0928	14	41	292	Fail
0.0939	11	39	354	Fail
0.0951	10	33	330	Fail
0.0963	10	29	290	Fail
0.0974	10	29	290	Fail
0.0986	9	26	288	Fail
0.0997	9	24	266	Fail
0.1009	9	23	255	Fail
0.1021	9	22	244	Fail
0.1032	8	22	275	Fail
0.1044	7	20	285	Fail
0.1056	7	19	271	Fail
0.1067	7	19	271	Fail
0.1079	7	19	271	Fail
0.1090	7	18	257	Fail
0.1102	7	15	214	Fail
0.1114	7	14	200	Fail
0.1125	7	13	185	Fail
0.1137	7	13	185	Fail
0.1149	7	13	185	Fail
0.1160	6	12	200	Fail
0.1172	5	11	220	Fail
0.1183	5	10	200	Fail
0.1195	5	9	180	Fail
0.1207	4	9	225	Fail
0.1218	4	9	225	Fail
0.1230	4	9	225	Fail
0.1242	4	9	225	Fail
0.1253	4	8	200	Fail
0.1265	4	8	200	Fail
0.1276	4	8	200	Fail
0.1288	4	8	200	Fail
0.1300	4	8	200	Fail
0.1311	4	8	200	Fail
0.1323	4	8	200	Fail
0.1335	4	8	200	Fail
0.1346	4	8	200	Fail
0.1358	4	7	175	Fail
0.1370	3	6	200	Fail

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.
The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.0224 acre-feet
On-line facility target flow:	0.0266 cfs.
Adjusted for 15 min:	0.0266 cfs.
Off-line facility target flow:	0.0151 cfs.
Adjusted for 15 min:	0.0151 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Total Volume Infiltrated		0.00	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Failed

Model Default Modifications

Total of 0 changes have been made.

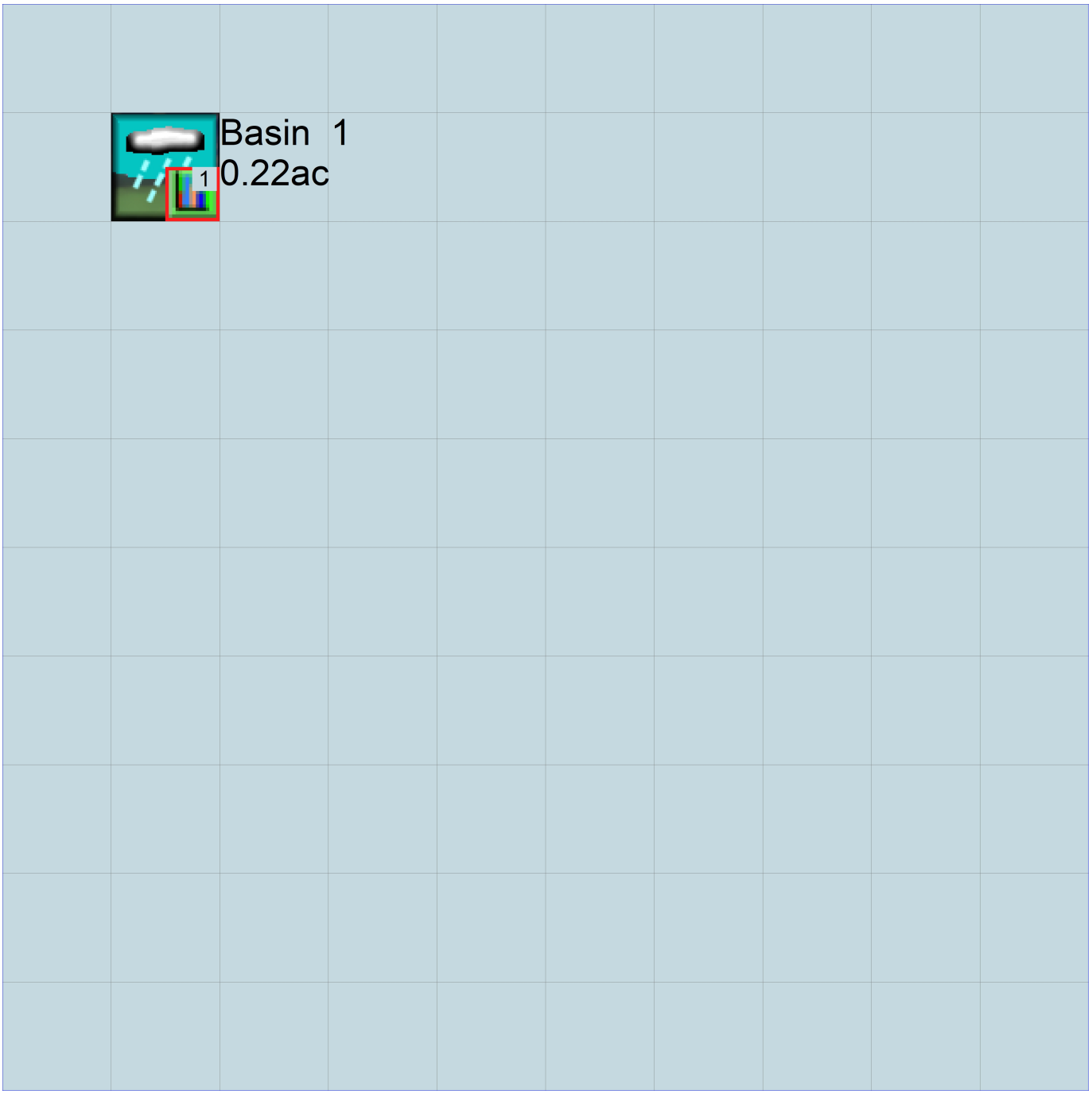
PERLND Changes

No PERLND changes have been made.

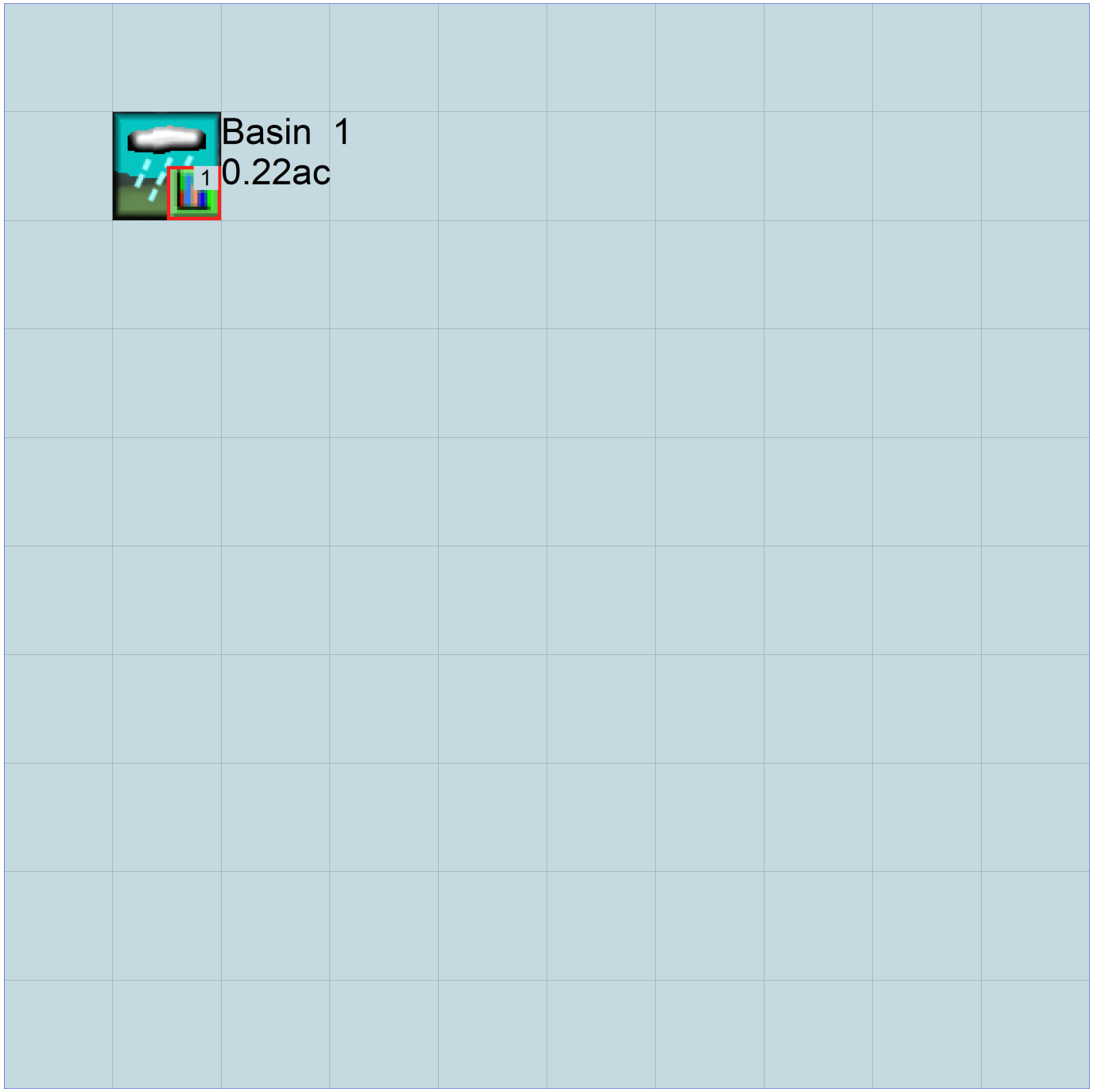
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1955 10 01        END    2011 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   Lift Station 3 Replacement.wdm
MESSU       25   PreLift Station 3 Replacement.MES
            27   PreLift Station 3 Replacement.L61
            28   PreLift Station 3 Replacement.L62
            30   POCLift Station 3 Replacement1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND       7
      IMPLND       4
      IMPLND       5
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                  MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                        in  out           ***
    7     A/B, Lawn, Flat         1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    7         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    7         0    0    4    0    0    0    0    0    0    0    0    0    1    9
```

```
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    7         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    7             0         5       0.8       400      0.05       0.3     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    7             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    7          0.1       0.5      0.25         0       0.7      0.25
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
             ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS       IFWS       LZS       AGWS      GWVS
    7             0         0         0          0         3          1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    4      ROOF TOPS/FLAT         1    1    1   27    0
    5      DRIVEWAYS/FLAT         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    4         0    0    1    0    0    0
    5         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    4         0    0    4    0    0    0    1    9
    5         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    4         0    0    0    0    0
    5         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    4            400      0.01       0.1       0.1
    5            400      0.01       0.1       0.1
```

```
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    4              0         0
    5              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    4              0         0
    5              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK   ***
<Name>   #                 <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND   7                      0.127     COPY   501     12
PERLND   7                      0.127     COPY   501     13
IMPLND   4                      0.046     COPY   501     15
IMPLND   5                      0.048     COPY   501     15

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                       in  out                              ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                  ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
```

```
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                        ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    0.889          PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.889          IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1955 10 01        END    2011 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   Lift Station 3 Replacement.wdm
MESSU       25   MitLift Station 3 Replacement.MES
            27   MitLift Station 3 Replacement.L61
            28   MitLift Station 3 Replacement.L62
            30   POCLift Station 3 Replacement1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND       7
      IMPLND       4
      IMPLND       5
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                   MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                        in  out           ***
    7     A/B, Lawn, Flat         1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    7         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    7         0    0    4    0    0    0    0    0    0    0    0    0    1    9
```

```
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    7         0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    7             0         5       0.8       400      0.05       0.3     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    7             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    7          0.1       0.5      0.25         0       0.7      0.25
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS       IFWS       LZS       AGWS      GWVS
    7             0         0         0          0         3          1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    4      ROOF TOPS/FLAT         1    1    1   27    0
    5      DRIVEWAYS/FLAT         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    4         0    0    1    0    0    0
    5         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    4         0    0    4    0    0    0    1    9
    5         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    4         0    0    0    0    0
    5         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    4            400      0.01       0.1       0.1
    5            400      0.01       0.1       0.1
```

```
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    4              0         0
    5              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    4              0         0
    5              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK   ***
<Name>   #                 <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND   7                      0.064     COPY   501     12
PERLND   7                      0.064     COPY   501     13
IMPLND   4                       0.01     COPY   501     15
IMPLND   5                      0.147     COPY   501     15

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                       in  out                              ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                  ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
```

```
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                        ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    0.889          PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.889          IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO      0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO      0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO      0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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Local (360)943-0304

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Appendix 2

Soil Management Plan

Appendix 2

Soil Management Plan

1.1 Soil Conditions

Three general soil units were observed in the two borings: fill, recessional outwash and glacial till.

Fill was on the order of 2 to 10 feet thick. The fill was deeper in B-1 (located north of the existing residence) than at B-2 located near the existing pump station. Fill typically consisted of very loose to medium dense silty sand.

Recessional outwash was observed below the fill and extended to around 45 feet below ground surface. At shallower depths (10 to 35 feet) the recessional outwash consisted of loose to medium dense sand with variable silt content. Below this the recessional outwash was typical dense to very dense and consisted of course sand with gravel.

Underlying the recessional outwash is glacial till which consisted of very dense silty sand and silty gravel.

Groundwater was measured around 9 feet below ground surface in B-1 and 5 feet below ground surface in B-2 at the time of drilling. We installed monitoring wells and pressure transducers in both borings. The pressure transducers will measure groundwater levels daily. We will report back on groundwater levels in a few weeks once we have collected more data.

Additional information on existing soil type, groundwater level, and soil hydraulic conductivity are included in the Geotechnical report, see Attachment 3.

1.2 Soil Quality Implementation

This project will utilize BMP T5.13 post-construction soil quality and depth, following implementation option 2, amend existing site topsoil or subsoil with default “pre-approved” rates.

Appendix 3

Core Requirements Flow Charts

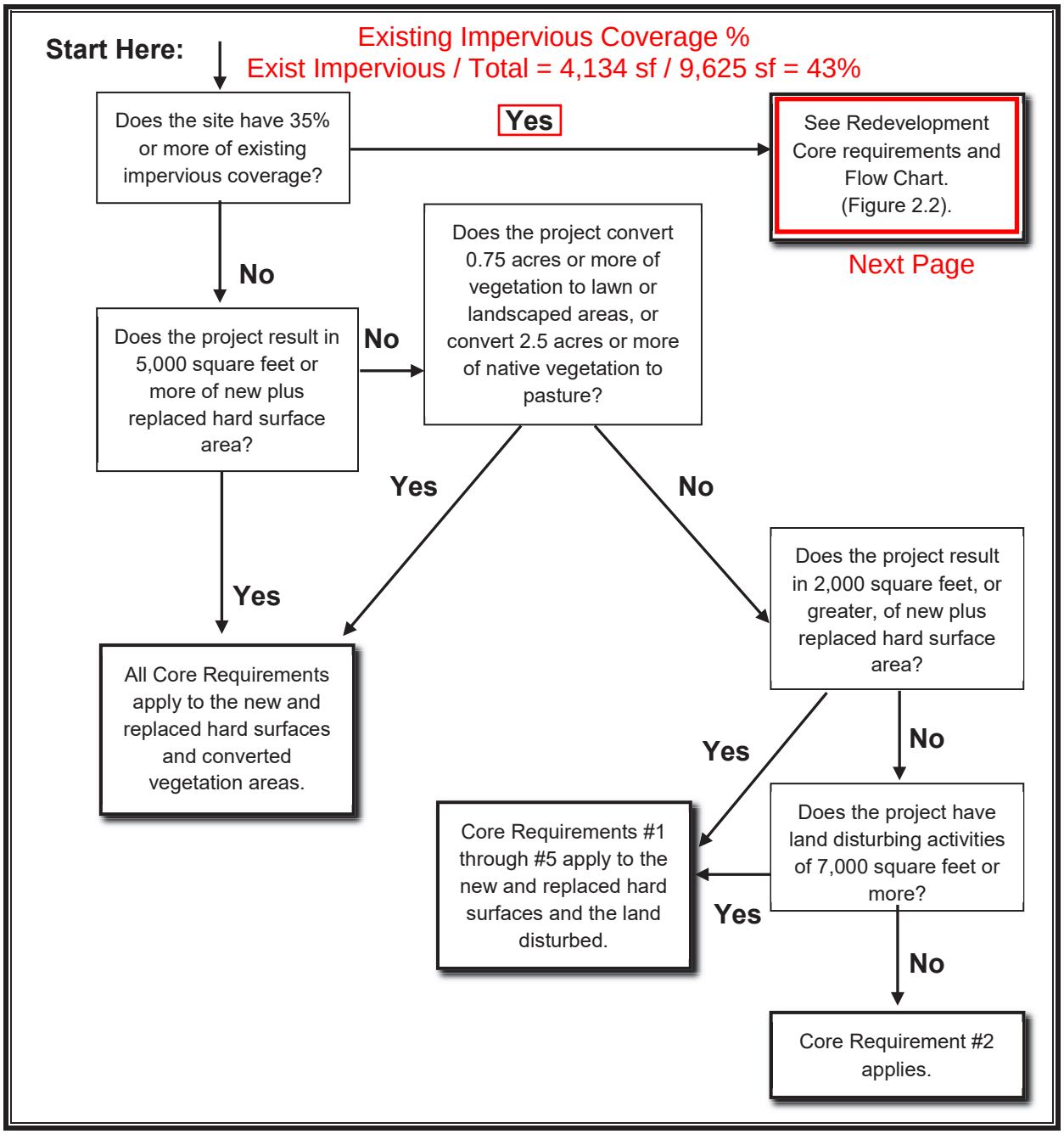

Figure 2.1. Flow Chart for Determining Requirements for New Development.

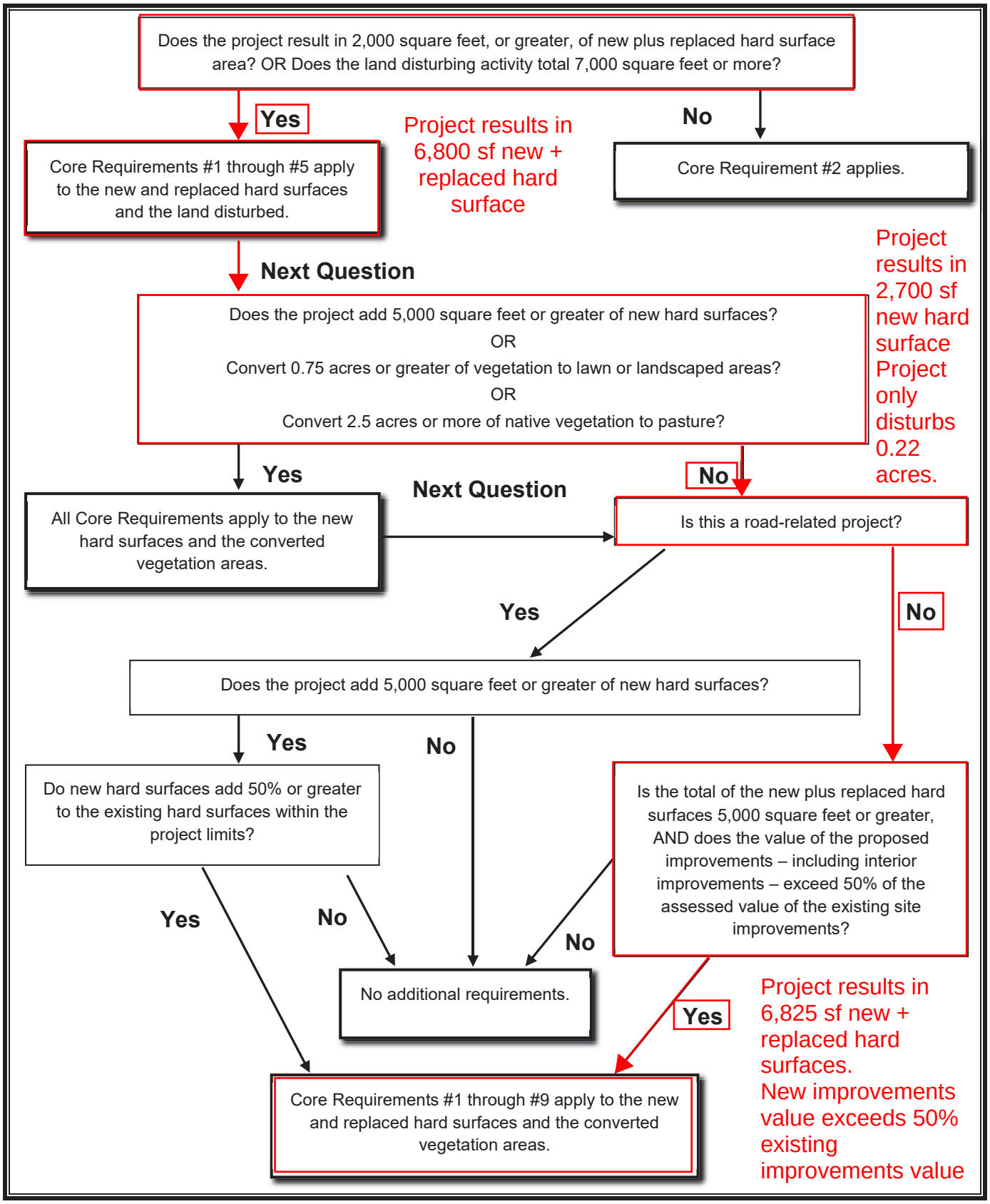

Figure 2.2. Flow Chart for Determining Requirements for Redevelopment.

Appendix 4

Existing and Proposed Area Measurements

Disparate Areas		Total Areas	Areas Type
	5,286 sf	5,286 sf	Pervious Area
195 sf	4,147 sf	4,342 sf	Impervious Area
	872 sf	872 sf	Pollution Generating Impervious Area

10" SQ. YARD DRAIN RIM=198.39
IE 6" PVC N.=197.53
SHED
EP
3' WOOD FENCE
6' WOOD FENCE
CHAIN LINK FENCE
PERGOLA W/SWING
4' CHAIN LINK FENCE
5' GATE
CONC
CONC
4.5' GATE
CONC
EAVE
3' GATE
HOUSE
4406
4' WOOD FENCE
4' CHAIN LINK FENCE
6' WOOD FENCE
4408
GENERATOR PAD
TOP NUT=196.3
6' X 2' PWR CAB
CONC WALK
CONC
5' WD. BUSH LINE
6' WOOD FENCE
CONC
6"X4" (TYP)
CONC
12" DI=196.66
1" IRON PIPE
48" SSMH RIM=198.57
IE 15" PVC W.=187.65
IE 15" PVC S.=187.77
IE 8" PVC E.=191.10
48" SSMH RIM=198.91
IE 8" PVC N.=186.89
IE 15" PVC E.=186.37
IE 15" PVC S.=186.48
C/L LIFT STA
4' X 6.5 MTL LID
3.5' HIGH PVC RAIL
C/L 10.5' X 4.5' MTL LID
GRAVEL
EP
TOP NUT=198.3
48" SSMH RIM=199.18
IE 15" PVC N.=186.68
IE 15" PVC E.=187.22
IE 15" PVC S.=186.77
36" SDMH RIM=198.22
IE 12" N.=196.41
IE 12" E.=196.37
IE 18" S.=196.17
EP
TOP NUT=197.9
TOP NUT=194.2
CONC D/W
TOP NUT=196.5
CB SOLID RIM=198.72
IE 18" PVC N.=195.87
IE 12" PVC E.=196.30
IE 18" PVC S.=195.87
EP
4401

10 5 0 10 20
1 Inch = 10 Feet

Shaping our community together
CITY OF LACEY

FIGURE# 1

LS3 Replacement

Existing Site Conditions

NOVEMBER 2021

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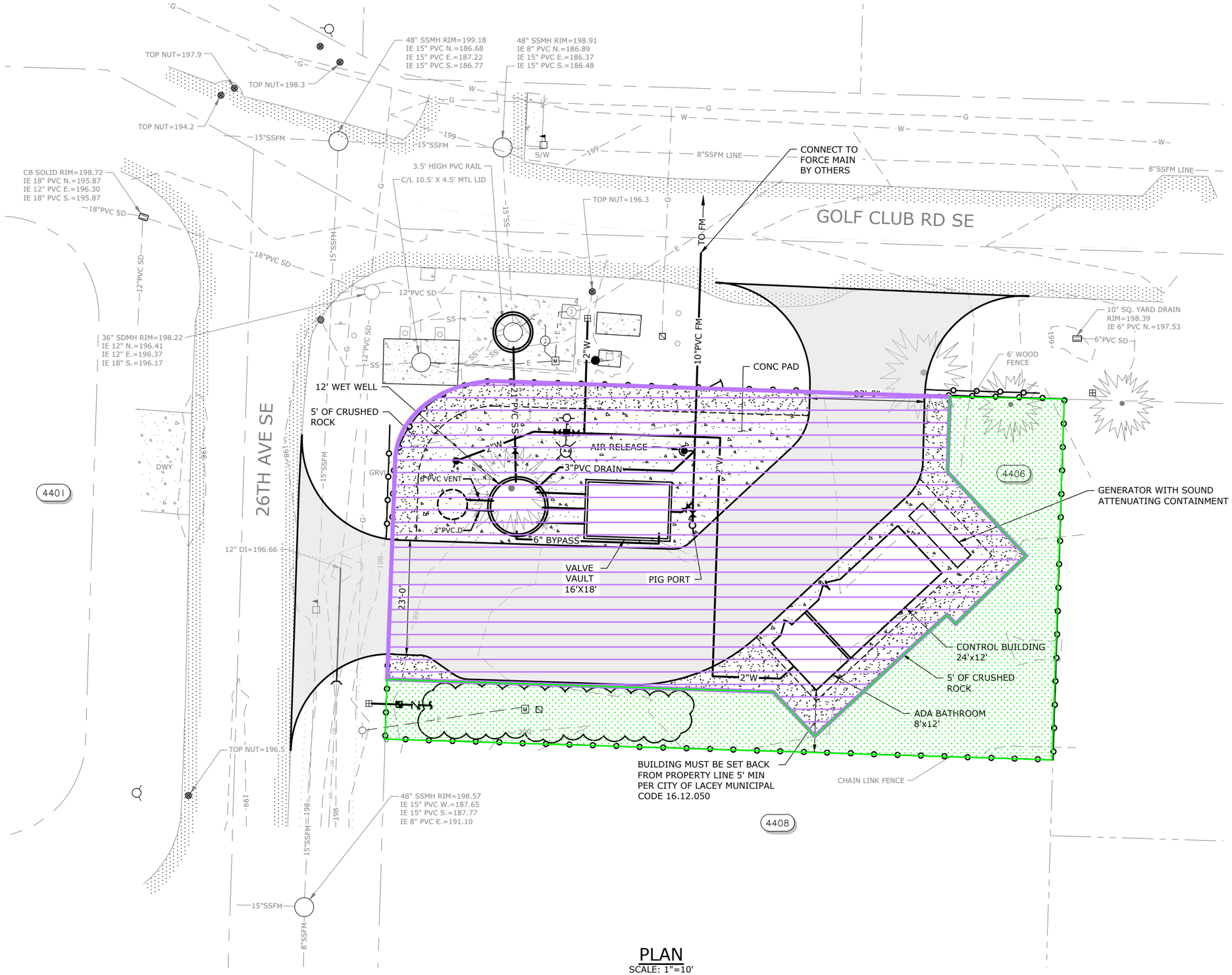
21-3174

K:\TAC_Projects\21\3171 - Lacey - LS3 Replacement\CAD\Figures\FIGURE 1.dwg FIGURE 1 7/8/2021 2:17 PM BRETT.WILLIAMS 23.0s (LMS Tech)

NOTES:

1. ALL EXISTING STRUCTURES TO BE REMOVED.

Total Areas	Areas Type
2,767 sf	Disturbed Pervious Area
6,835 sf	Impervious Area
0 sf	Pollution Generating Impervious Area



PLAN
SCALE: 1"=10'

10 5 0 10 20
1 Inch = 10 Feet

Shaping our community together
CITY OF LACEY

FIGURE# 1

LS3 Replacement

Proposed Site Plan

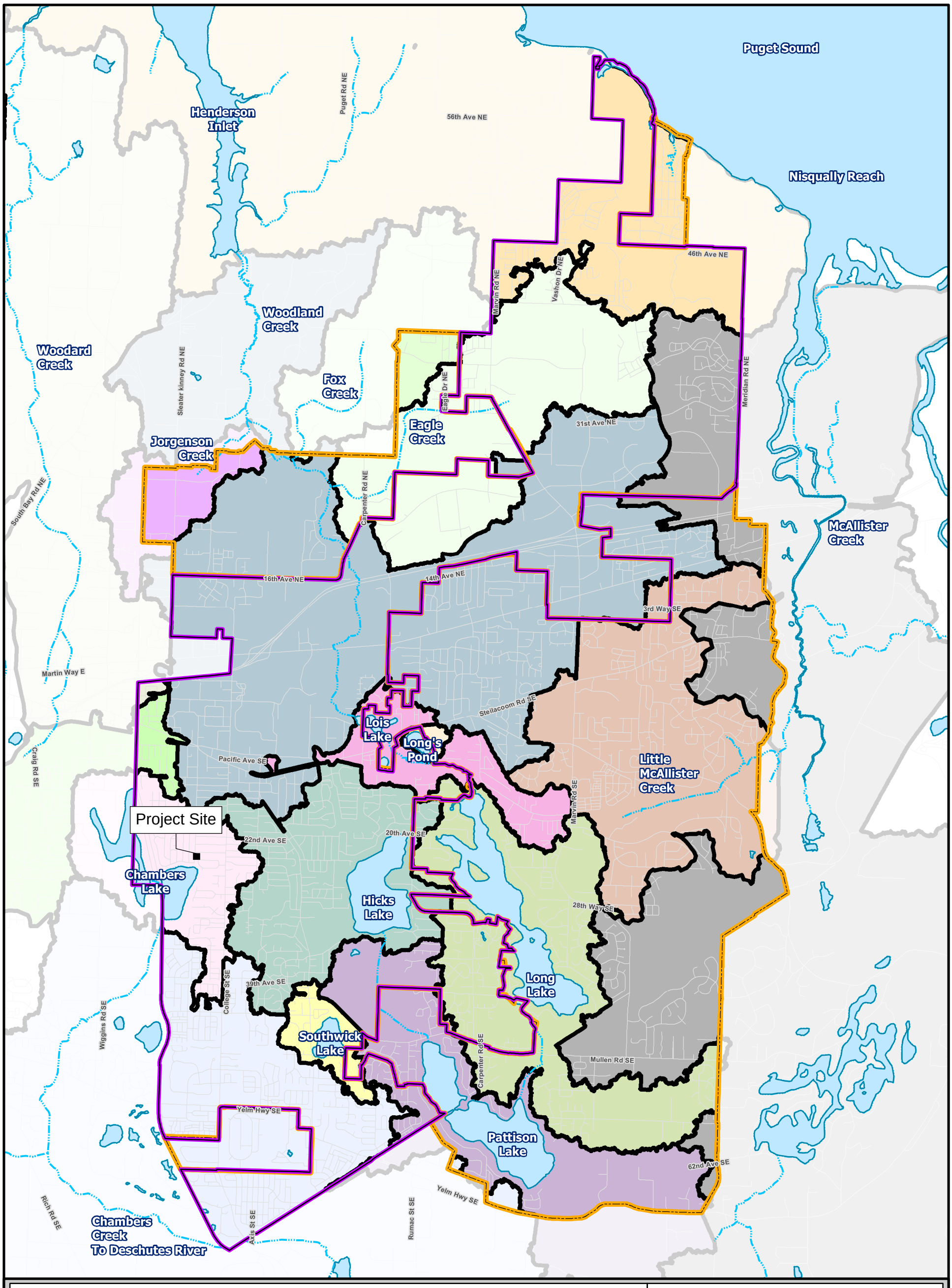
NOVEMBER 2021

murraysmith

21-3174

Appendix 5

Basin and Critical Area Maps



Legend

- City of Lacey
- Urban growth boundary
- Waterbody
- Stream

Basins

- Chambers Lake
- Deschutes River
- Eagle Creek
- Fox Creek
- Long's Pond
- Henderson Inlet
- Hicks Lake
- Indian Creek
- Jorgenson Creek
- Lake Lois
- Little McAllister Creek
- Long Lake
- McAllister Creek
- Pattison Lake
- Southwick Lake
- Woodard Creek Outlet
- Woodland Creek Outlet

Figure 2-4. Drainage Basins Within the City of Lacey.

N

0 2,000 4,000 8,000 Feet

HERRERA

City of Lacey, Waterbody, Stream, UGB (City of Lacey)

K:\Projects\Y2010\10-04793-000\Project\DrainageBasins_OnlyWB.mxd (2/13/2020)

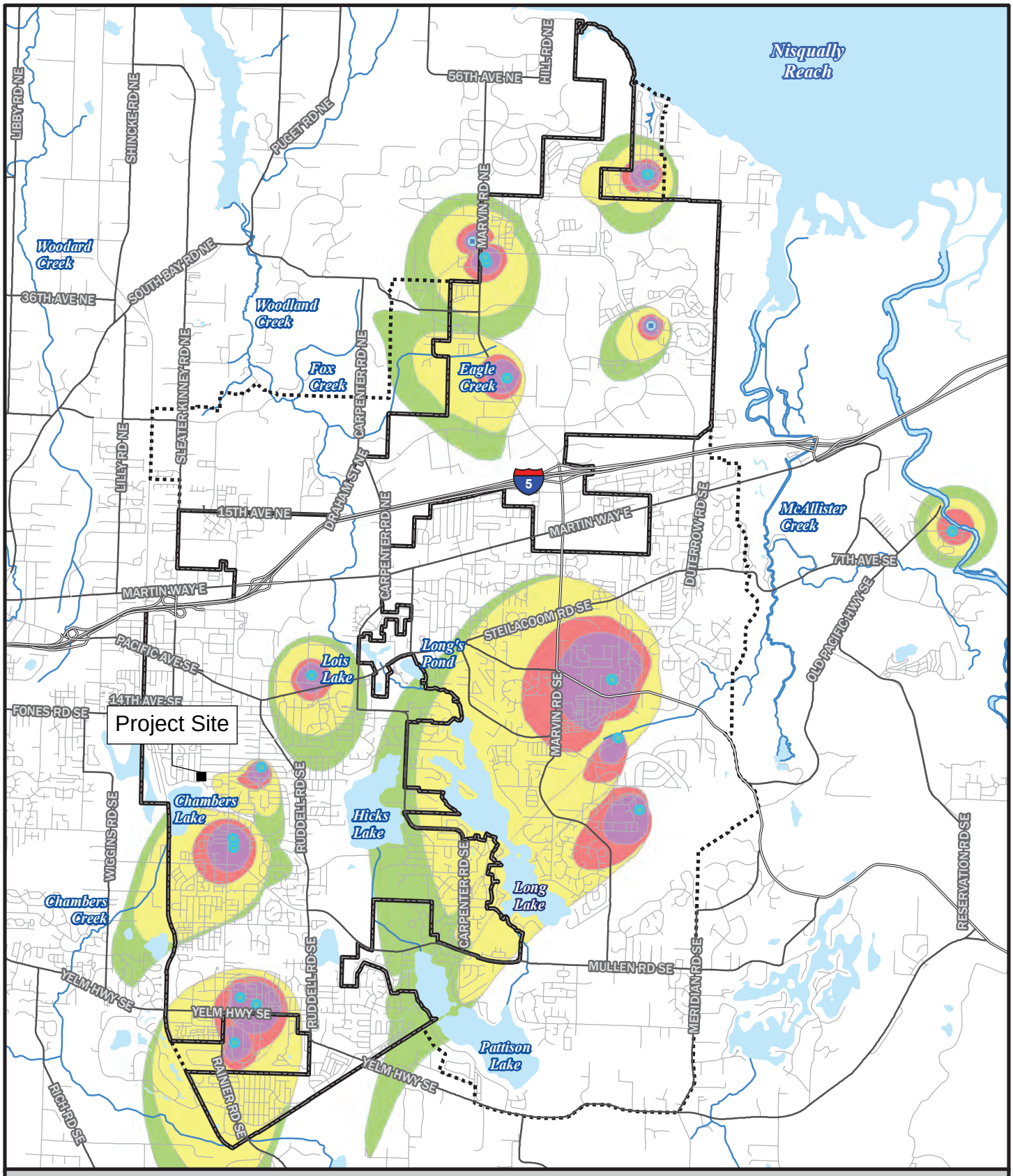


Figure 8B.1. Wellhead Protection Areas.

N

0 3,000 6,000 12,000

Feet

K:\Projects\Y2015\15-06014-000\Project\WHPAs.mxd (6/21/2016)

Legend

- Lacey City Limits
- Urban Growth Management Area (UGMA)
- River
- Waterbody

Production Wells: Future, Active

Wellhead Protection Areas (2013)

- 10-year
- 5-year
- 1-year
- 6-month

CITY OF LACEY

HERRERA

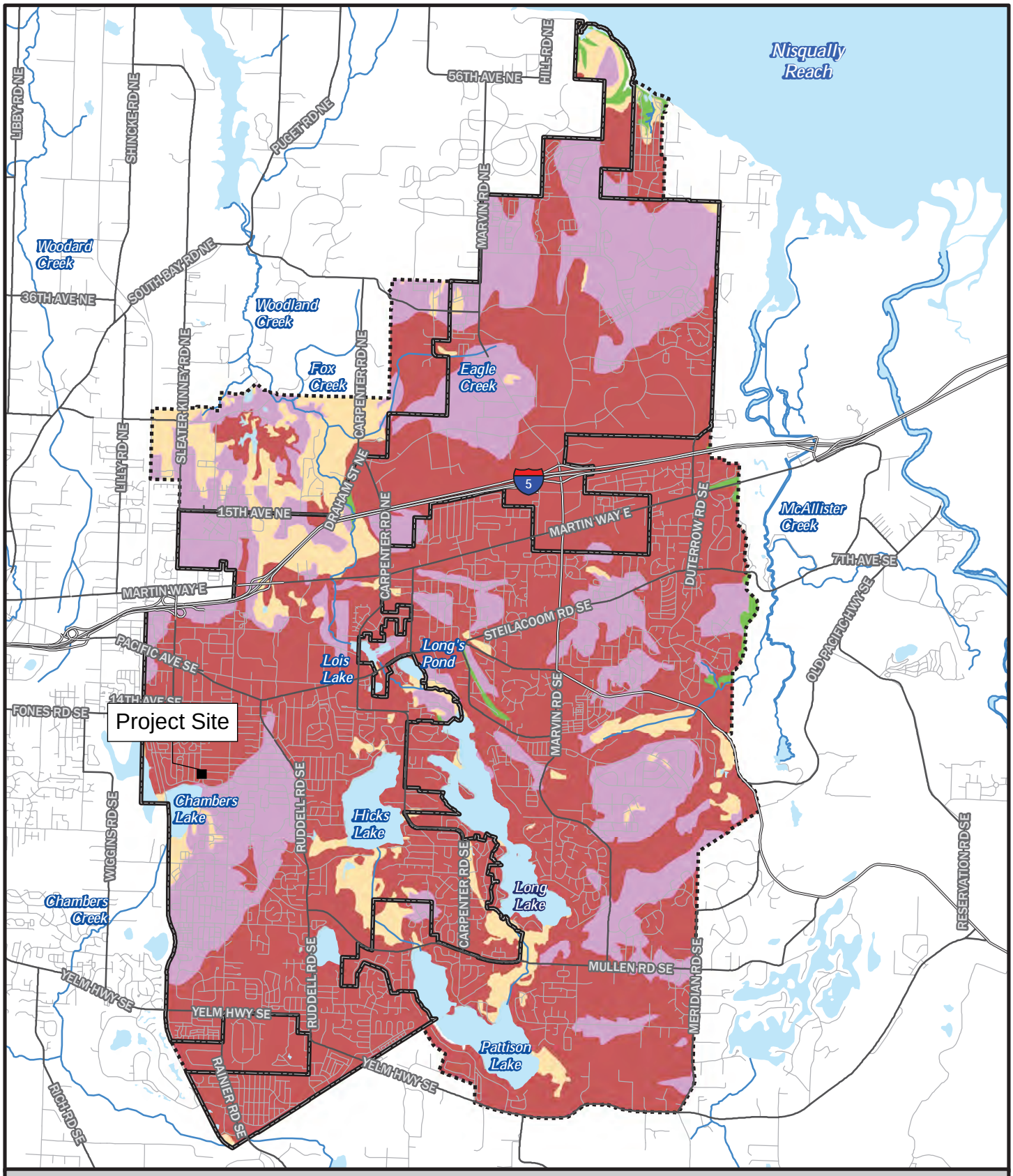


Figure 8B.2. Critical Aquifer Recharge Areas.

N

0 3,000 6,000 12,000

Feet

K:\Projects\Y2015\15-06014-000\Project\critical_aquifer_recharge_areas.mxd (6/21/2016)

Legend

- Lacey City Limits
- Urban Growth Management Area (UGMA)
- River
- Waterbody

Critical Aquifer Recharge Area (CARA)

- Category I
- Category II
- Category III
- Category IV

CITY OF LACEY

HERRERA

Attachment 1

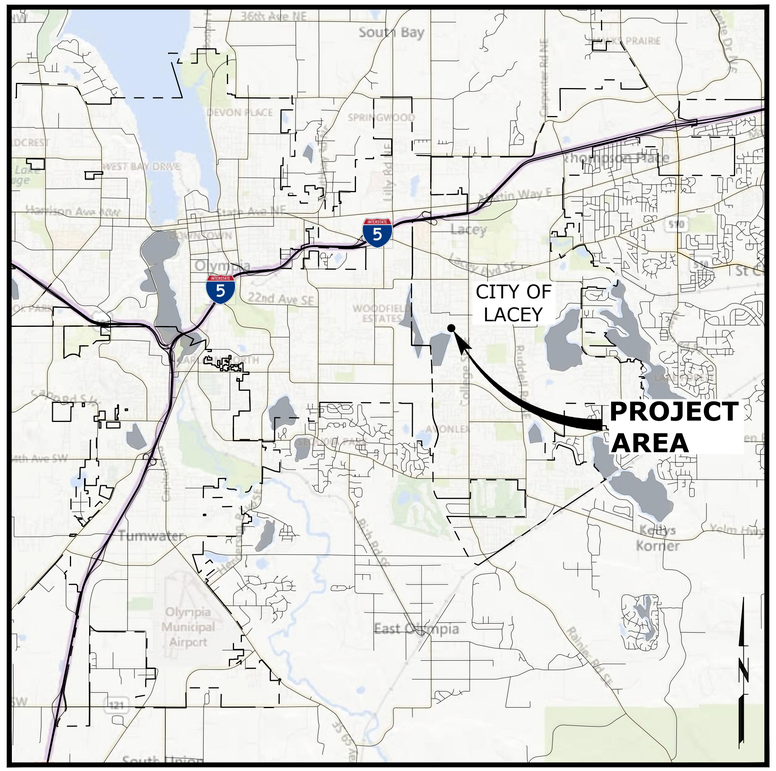
Site Development Drawings

CITY OF LACEY, WASHINGTON
LIFT STATION NO. 3 REPLACEMENT
LACEY CONTRACT #PW 2021-06

FEBRUARY 2022

60% SUBMITTAL

INDEX OF DRAWINGS



VICINITY MAP
SCALE: 1" = 1/12 MILE

CITY OF LACEY OFFICIALS

MAYOR:
ANDY RYDER

DEPUTY MAYOR:
CYNTHIA PRATT

COUNCIL MEMBERS:
CAROLYN COX
ED KUNKEL
LENNY GREENSTEIN
MALCOLM MILLER
MICHAEL STEADMAN

CITY MANAGER:
SCOTT SPENCE

CITY ATTORNEY:
DAVE SCHNEIDER

CITY ENGINEER:
ROGER SCHOESSEL, P.E.

DIRECTOR OF PUBLIC WORKS:
SCOTT EGGER, P.E.

APPROVED FOR CONSTRUCTION DATE

murraysmith
1145 BROADWAY
TACOMA, WA 98402

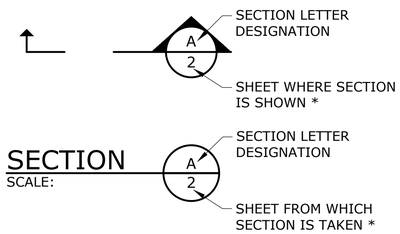
811 Know what's below. Call before you dig.

PIPE SYMBOLS

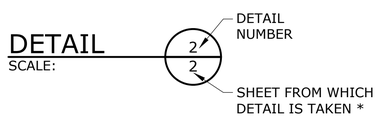
PLANT	SCHEMATIC	
		WELDED JOINT
		FLANGED JOINT
		GROOVED END JOINT
		MECHANICAL JOINT
		PUSH-ON JOINT (RUBBER GASKET)
		FLANGED COUPLING ADAPTER
		DOUBLE BALL FLEXIBLE EXTENSION COUPLING
		FLEXIBLE COUPLING W/THRUST RING
		ELBOW UP
		ELBOW DOWN
		TEE UP
		TEE DOWN
		LATERAL UP
		LATERAL DOWN
		CONCENTRIC REDUCER
		ECCENTRIC REDUCER
		UNION
		BLIND FLANGE
		CAP
		LONG SLEEVE
		FLEXIBLE COUPLING
		CAPPED END OR PLUGGED END
		FITTING

SECTION AND DETAIL DESIGNATIONS

SECTION DESIGNATIONS



DETAIL DESIGNATIONS



* NOTE: IF PLAN AND SECTION FOR DETAIL CALL-OUT AND DETAIL ARE SHOWN ON THE SAME DRAWING, DRAWING NUMBER IS REPLACED WITH A DASH.

TOPOGRAPHIC LEGEND

	EXISTING	PROPOSED
WATERLINE	10"W	12"DI W
ELECTRICITY	E	E
GAS	4"G	4"G
TELEPHONE/TELEMETRY	T	T
CABLE TELEVISION	CATV	CATV
SANITARY SEWER LINE	8"SS	8"SS
SANITARY SEWER FORCE MAIN	6"FM	6"FM
STORM DRAIN	8"SD	8"SD
CULVERT		12"D
ABANDON PIPE		
DRAINAGE DITCH		
BARBWIRE FENCE		
CHAIN LINK FENCE		
TEMPORARY SILT FENCE		
GUARDRAIL		
ROCK WALL		
TREE/BUSH LINE		
CENTERLINE		
EASEMENT/PROPERTY LINE		
RIGHT-OF-WAY		
EDGE OF PAVEMENT/AC		
EDGE OF GRAVEL		
CURB		
SIDEWALK	S/W	S/W
STRUCTURE OR FACILITY		
CONTOUR MINOR		
CONTOUR MAJOR	200	200
MANHOLE		
CLEAN-OUT		
CATCH BASIN/FIELD INLET		
THRUST BLOCK		
VALVE		
AIR INJECTION ASSEMBLY		
BLOW-OFF ASSEMBLY		
AIR RELEASE ASSEMBLY		
FIRE HYDRANT ASSEMBLY		
WATER METER		
PULL BOX/JUNCTION BOX		
UTILITY POLE		
GUY WIRE		
LIGHT POST		
MAIL BOX		
SIGN		
BENCHMARK		
TREE DECIDUOUS		
TREE CONIFEROUS		
TREE TO BE REMOVED		
SURFACE ELEVATION	+ 176.63	+ 176.63

VALVE SYMBOLS

PLANT	SCHEMATIC	
		GATE VALVE
		GLOBE VALVE
		BALL VALVE
		BALANCING VALVE
		DIAPHRAGM VALVE
		PLUG VALVE (TOP)
		PLUG VALVE (SIDE)
		3-WAY PLUG VALVE
		SWING CHECK VALVE
		DOUBLE CHECK ASSEMBLY
		BALL SWING CHECK
		SILENT CHECK VALVE
		PRESSURE REDUCING VALVE
		ALTITUDE CONTROL VALVE
		SOLENOID VALVE
		RELIEF VALVE
		NEEDLE VALVE
		HOSE VALVE
		REDUCED PRESSURE BACKFLOW PREVENTER W/GATE VALVES
		HOSE BIBB

MISCELLANEOUS PIPING SYMBOLS

	STRAINER
	SIGHT GLASS
	PRESSURE GAUGE W/COCK
S	PRESSURE SWITCH W/COCK
M	METER
SP	SLIP ON JOINT PIPE
R	RESTRAINED JOINT PIPE

60% SUBMITTAL

NO.	DATE	BY	REVISION

NOTICE

0 ½ 1

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

MCD DESIGNED
MNF DRAWN
PBC CHECKED

PRELIMINARY ONLY
DO NOT USE FOR CONSTRUCTION
PETER C. MURRAY
48352
REGISTERED PROFESSIONAL ENGINEER
February 4, 2022
murraysmith

murraysmith

Shaping our community together
CITY OF LACEY

CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

SYMBOLS & LEGEND

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET **G-2**

2 of 51

K:\TAC_Projects\21\3171 - Lacey - LS3 Replacement\CAD\Sheets\21-3171-WA-G.dwg G-2 2/18/2022 4:57 PM MATT.ESTEP 23.0s (LMS Tech)

@	AT
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY & TRANSPORTATION OFFICIALS
AB	ANCHOR BOLT
ABAN (D)	ABANDON (ED)
ABS	ACRYLONITRILE BUTADIENE STYRENE
ABV	ABOVE
AC	ASPHALTIC CONCRETE
ACP	ASPHALTIC CONCRETE PAVING
ADJ	ADJUSTABLE
ADJC	ADJACENT
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHR	ANCHOR
AL	ALUMINUM
ALT	ALTERNATE
AMP	AMPERE
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
APPROX	APPROXIMATE
APPVD	APPROVED
APWA	AMERICAN PUBLIC WORKS ASSOCIATION
ARCH	ARCHITECTURAL
ARV	AIR RELEASE VALVE
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ASSN	ASSOCIATION
ASSY	ASSEMBLY
ASTM	AMERICAN SOCIETY FOR TESTING & MATERIALS
ATM	ATMOSPHERE
AUTO	AUTOMATIC
AUX	AUXILIARY
AVE	AVENUE
AVG	AVERAGE
AWWA	AMERICAN WATER WORKS ASSOCIATION
B&S	BELL & SPIGOT
BC	BOLT CIRCLE
BD	BOARD
BETW	BETWEEN
BF	BOTH FACE
BFD	BACKFLOW PREVENTION DEVICE
BFILL	BACK FILL
BFV	BUTTERFLY VALVE
BHP	BRAKE HORSEPOWER
BKGD	BACKGROUND
BLDG	BUILDING
BLK	BLOCK
BLVD	BOULEVARD
BM	BENCH MARK / BEAM
BMP	BEST MANAGEMENT PRACTICE
BO	BLOWOFF
BOC	BACK OF CURB
BS	BOTH SIDES
BSMT	BASEMENT
BTF	BOTTOM FACE
BTU	BRITISH THERMAL UNIT
BV	BALL VALVE
BW	BOTH WAYS
C	CELSIUS
C TO C	CENTER TO CENTER
CARV	COMBINATION AIR RELEASE VALVE
CATV	CABLE TELEVISION
CB	CATCH BASIN
CCP	CONCRETE CYLINDER PIPE
CCW	COUNTER CLOCKWISE
CFM	CUBIC FEET PER MINUTE
CFS	CUBIC FEET PER SECOND
CHAN	CHANNEL
CHEM	CHEMICAL
CHFR	CHAMFER
CHKV	CHECK VALVE
CI	CAST IRON
CIP	CAST IRON PIPE
CIPC	CAST IN PLACE CONCRETE
CISP	CAST IRON SOIL PIPE
CJ	CONSTRUCTION JOINT
CL or ℄	CENTER LINE
CL2	CHLORINE
CLG	CEILING
CLJ	CONTROL JOINT
CLR	CLEAR
CLSM	CONTROLLED LOW STRENGTH MATERIAL
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CND	CONDUIT
CO	CLEANOUT
COL	COLUMN
COMB	COMBINATION
CONC	CONCRETE
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUOUS / CONTINUATION
CONTR	CONTRACT (OR)
COORD	COORDINATE
COP	COPPER
CORP	CORPORATION
CORR	CORRUGATED
CP	CONTROL POINT
CPLG	COUPLING
CPVC	CHLORINATED POLYVINYL CHLORIDE
CR	CRUSHED ROCK
CS	COMBINED SEWER
CSP	CONCRETE SEWER PIPE
CT	COURT
CTR	CENTER
CU	CUBIC
CULV	CULVERT
CV	CONTROL VALVE
CW	CLOCKWISE / COLD WATER
CY	CUBIC YARDS
CYL	CYLINDER LOCK
D	DRAIN
DBFEJ	DOUBLE BALL FLEXIBLE EXPANSION JOINT
DC	DIRECT CURRENT
DEFL	DEFLECTION
DET	DETAIL
DI	DUCTILE IRON
DIA	DIAMETER
DIM	DIMENSION
DIR	DIRECTION
DIST	DISTANCE
DN	DOWN
DR	DRIVE
DS	DOWNSPOUT
DWG	DRAWING
DWL	DOWEL
DWV	DRAIN WASTE AND VENT
DWY	DRIVEWAY
EA	EACH
ECC	ECCENTRIC
EF	EACH FACE
EL	ELEVATION
ELB	ELBOW
ELEC	ELECTRICAL
ENCL	ENCLOSURE
EOP	EDGE OF PAVEMENT
EQ	EQUAL
EQL SP	EQUALLY SPACED
EQUIP	EQUIPMENT
EW	EACH WAY
EXC	EXCAVATE
EXIST	EXISTING
EXIST GR	EXISTING GRADE
EXP	EXPANSION
EXP BT	EXPANSION BOLT
EXP JT	EXPANSION JOINT
EXT	EXTERIOR
F	FAHRENHEIT
F TO F	FACE TO FACE
FAB	FABRICATE
FB	FLAT BAR
FCA	FLANGED COUPLING ADAPTER
FCO	FLOOR CLEANOUT
FD	FLOOR DRAIN
FDN	FOUNDATION
FEXT	FIRE EXTINGUISHER
FF	FAR FACE
FGL	FIBERGLASS
FH	FIRE HYDRANT
FIN FL	FINISH FLOOR
FIN GR	FINISH GRADE
FIPT	FEMALE IRON PIPE THREAD
FITG	FITTING
FL	FLOOR LINE
FLEX	FLEXIBLE
FLG	FLANGE
FLL	FLOW LINE
FLR	FLOOR
FM	FORCE MAIN
FO	FIBER OPTIC
FOC	FACE OF CONCRETE
FOF	FACE OF FINISH
FOM	FACE OF MASONRY
FOS	FACE OF STUDS
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FRP	FIBERGLASS REINFORCED PLASTIC
FT	FEET / FOOT
FTG	FOOTING
FUT	FUTURE
FXTR	FIXTURE
G	GAS
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GC	GROOVED COUPLING
GFA	GROOVED FLANGE ADAPTER
GI	GALVANIZED IRON
GIP	GALVANIZED IRON PIPE
GJ	GRIP JOINT
GL	GLASS
GLV	GLOBE VALVE
GND	GROUND
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GPS	GALLONS PER SECOND
GR	GRADE
GR LN	GRADE LINE
GRTG	GRATING
GV	GATE VALVE
GRVL	GRAVEL
GYP	GYPSUM
HB	HOSE BIBB
HC	HOLLOW CORE
HDPE	HIGH DENSITY POLYETHYLENE
HDR	HEADER
HDWE	HARDWARE
HGR	HANGER
HGT	HEIGHT
HH	HANDHOLD
HM	HOLLOW METAL
HNDRL	HAND RAIL
HOA	HAND-OFF-AUTO
HOR	HAND-OFF-REMOTE
HORIZ	HORIZONTAL
HP	HIGH PRESSURE / HORSEPOWER
HPG	HIGH PRESSURE GAS
HPT	HIGH POINT
HR	HOUR
HSB	HIGH STRENGTH BOLT
HV	HOSE VALVE
HVAC	HEATING, VENTILATION, AIR CONDITIONING
HWL	HIGH WATER LINE
HWY	HIGHWAY
HYD	HYDRANT
HYDR	HYDRAULIC
I&C	INSTRUMENTATION & CONTROL
IAW	IN ACCORDANCE WITH
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IF	INSIDE FACE
IMPVT	IMPROVEMENT
IN	INCH
INCC	INCLUDE (D) (ING)
INFL	INFLUENT
INJ	INJECTION
INSTL	INSTALLATION / INSTALL
INSUL	INSULATION
INTER	INTERCEPTOR
INTR	INTERIOR
INV	INVERT
IP	IRON PIPE
IPT	IRON PIPE THREAD
IR	IRON ROD
IRRIG	IRRIGATION
JT	JOINT
JUNC	JUNCTION
KPL	KICK PLATE
KVA	KILOVOLT AMPERE
KW	KILOWATT
KWY	KEYWAY
L	LENGTH OF CURVE
LAB	LABORATORY
LAV	LAVATORY
LB	POUND
LF	LINEAL FOOT
LIN	LINEAL / LINEAR
LN	LANE
LOC	LOCATION
LONG	LONGITUDINAL
LP	LOW PRESSURE
LPT	LOW POINT
LRG	LARGE
LS	LONG SLEEVE / LUMP SUM
LT	LEFT
LVL	LEVEL
LWL	LOW WATER LINE
MAN	MANUAL
MATL	MATERIAL
MAX	MAXIMUM
MCC	MOTOR CONTROL CENTER
MCP	MASTER CONTROL PANEL
MECH	MECHANICAL
MET	METAL
MFR	MANUFACTURER
MGD	MILLION GALLONS PER DAY
MH	MANHOLE
MIN	MINIMUM
MIPT	MALE IRON PIPE THREAD
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MON	MONUMENT / MONOLITHIC
MOT	MOTOR
MP	MILEPOST
MSL	MEAN SEA LEVEL
MTD	MOUNTED
NA	NOT APPLICABLE
NC	NORMALLY CLOSED
NF	NEAR FACE
NIC	NOT IN CONTRACT
NO / NO.	NORMALLY OPEN / NUMBER
NOM	NOMINAL
NORM	NORMAL
NRS	NON-RISING STEM
NTS	NOT TO SCALE
O TO O	OUT TO OUT
OC	ON CENTER
OD	OUTSIDE DIAMETER
ODOT	OREGON DEPARTMENT OF TRANSPORTATION
OF	OVERFLOW / OUTSIDE FACE
OPNG	OPENING
OPP	OPPOSITE
ORIG	ORIGINAL
OVHD	OVERHEAD
P&ID	PROCESS & INSTRUMENTATION DIAGRAM
PC	POINT OF CURVE
PCC	POINT OF COMPOUND CURVE
PCVC	POINT OF CURVATURE ON VERTICAL CURVE
PE	PLAIN END
PERF	PERFORATED
PERM	PERMANENT
PERP	PERPENDICULAR
PG	PRESSURE GAUGE
PH	PIPE HANGER
PI	POINT OF INTERSECTION
PIVC	POINT OF INTERSECTION ON VERTICAL CURVE
PL or ℄	PROPERTY LINE / PLATE / PLASTIC
PLBG	PLUMBING
PNL	PANEL
POC	POINT OF CURVATURE
POLY	POLYETHYLENE
POT	POINT OF TANGENCY
PP	POWER POLE
PRC	POINT OF REVERSE CURVATURE
PRCST	PRECAST
PREP	PREPARATION
PRESS	PRESSURE
PRKG	PARKING
PROP	PROPERTY
PRV	PRESSURE REDUCING VALVE
PS	PUMP STATION
PSIG	POUNDS PER SQUARE INCH GAGE
PSL	PIPE SLEEVE
PSPT	PIPE SUPPORT
PT	POINT OF TANGENCY
PTVC	POINT OF TANGENCY ON VERTICAL CURVE
PV	PLUG VALVE
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
PWR	POWER
QTY	QUANTITY
RAD	RADIUS
RC	REINFORCED CONCRETE
RCP	REINFORCED CONCRETE PIPE
RD	ROAD / ROOF DRAIN
RDCR	REDUCER
REF	REFERENCE
REINF	REINFORCE (D) (ING) (MENT)
REQ'D	REQUIRED
RESTR	RESTRAINED
RFCA	RESTRAINED FLANGE COUPLING ADAPTER
RM	ROOM
RND	ROUND
RO	ROUGH OPENING
ROW or R/W	RIGHT OF WAY
RPBPD	REDUCED PRESSURE BACKFLOW PREVENTION DEVICE
RPM	REVOLUTIONS PER MINUTE
RR	RAILROAD
RST	REINFORCING STEEL
RT	RIGHT
SALV	SALVAGE
SAN	SANITARY
SC	SOLID CORE
SCHED	SCHEDULE
SD	STORM DRAIN
SDL	SADDLE
SDR	STANDARD DIMENSION RATIO
SECT	SECTION
SHLDR	SHOULDER
SHT	SHEET
SIM	SIMILAR
SLP	SLOPE
SLV	SLEEVE
SOLN	SOLUTION
SP	SOIL PIPE / SEWER PIPE
SPCL	SPECIAL
SPEC (S)	SPECIFICATION (S)
SPG	SPACING
SPL	SPOOL
SPRT	SUPPORT
SQ	SQUARE
SQ FT	SQUARE FOOT
SQ IN	SQUARE INCH
SQ YD	SQUARE YARD
SS	SANITARY SEWER
SST	STAINLESS STEEL
ST	STREET
STA	STATION
STD	STANDARD
STL	STEEL
STOR	STORAGE
STR	STRAIGHT
STRUCT	STRUCTURE / STRUCTURAL
SUBMG	SUBMERGED
SUCT	SUCTION
SV	SOLENOID VALVE
S/W	SIDEWALK
SWD	SIDEWATER DEPTH
SWGR	SWITCH GEAR
SYMM	SYMMETRICAL
SYS	SYSTEM
T or TEL	TELEPHONE
T&B	TOP & BOTTOM
TAN	TANGENCY
TB	THRUST BLOCK
TBM	TEMPORARY BENCH MARK
TC	TOP OF CONCRETE / TOP OF CURB
TDH	TOTAL DYNAMIC HEAD
TEMP	TEMPERATURE / TEMPORARY
T&G	TONGUE & GROOVE
THK	THICKNESS
THRD	THREAD(ED)
THRU	THROUGH
TP	TEST PIT/TOP OF PAVEMENT/TURNING POINT
TRANS	TRANSITION
TSP	TRI-SODIUM PHOSPHATE
TST	TOP OF STEEL
TW	TOP OF WALL
TYP	TYPICAL
UG	UNDERGROUND
UH	UNIT HEATER
UN	UNION
UON	UNLESS OTHERWISE NOTED
USGS	UNITED STATES GEOLOGIC SURVEY
V	VENT / VOLT
VAC	VACUUM
VB	VACUUM BREAKER
VBOX	VALVE BOX
VC	VERTICAL CURVE
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VOL	VOLUME
VCP	VITRIFIED CLAY PIPE
VTR	VENT THROUGH ROOF
W	WATER
W/	WITH
W/O	WITHOUT
W/W	WALL TO WALL
WD	WOOD
WF	WIDE FLANGE
WH	WALL HYDRANT
WHTR	WATER HEATER
WI	WROUGHT IRON
WM	WATER METER
WP	WORKING POINT / WATERPROOFING
WS	WATER SERVICE
WSDOT	WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
WT	WEIGHT
WTP	WATER TREATMENT PLANT
WTRT	WATERTIGHT
WWF	WELDED WIRE FABRIC
WWTF	WASTEWATER TREATMENT FACILITY
WWTP	WASTEWATER TREATMENT PLANT
X SECT	CROSS SECTION
XFMR	TRANSFORMER
YD	YARD DRAIN/YARD
YH	YARD HYDRANT
YR	YEAR
ZN	ZINC

60% SUBMITTAL

NO.	DATE	BY	REVISION

NOTICE

0 ½ 1

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

MCD DESIGNED

MNF DRAWN

PBC CHECKED

PRELIMINARY ONLY
DO NOT USE FOR CONSTRUCTION
February 2022
Murraysmith

murraysmith

Shaping our community together
CITY OF LACEY

CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

ABBREVIATIONS

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET **G-3**

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K:\TAC_Projects\21\3171 - Lacey - LS3 Replacement\CAD\Sheets\21-3171-WA-G.dwg G-3 2/18/2022 4:57 PM MATT.ESTEP 23.0s (LMS Tech)

GENERAL NOTES

1. CONTRACTOR SHALL ADHERE TO THE CITY OF LACEY DEVELOPMENT GUIDELINES & PUBLIC WORKS STANDARDS FOR SANITARY SEWER CONSTRUCTION.

2. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK AND SHALL IMMEDIATELY NOTIFY THE ENGINEER OF ANY DISCREPANCIES.

3. THE LOCATION OF EXISTING UNDERGROUND UTILITY SYSTEMS, AS SHOWN HEREON, ARE SHOWN IN AN APPROXIMATE WAY ONLY. WATER AND GAS SERVICE LINES MAY NOT BE SHOWN. THE CONTRACTOR SHALL ANTICIPATE SUCH SERVICES. THE CONTRACTOR SHALL LOCATE AND PROTECT ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES. ALL LOCATOR SERVICES SHOULD BE CONTACTED PRIOR TO ANY CONSTRUCTION OR SUBSURFACE EXPLORATION.

4. CONTRACTOR SHALL POTHOLE ALL EXISTING UTILITIES INCLUDING SEWER MAIN, FORCE MAIN, AND LATERALS TO DETERMINE THEIR EXACT HORIZONTAL AND VERTICAL LOCATION IN ACCORDANCE WITH SPECIFICATION 7-08.3(1)

5. LINEAL FOOTAGE OF PIPING SHOWN ON THE DRAWINGS REFERS TO THE HORIZONTAL LENGTHS.

6. PRIOR TO BACKFILL ALL PIPES AND APPURTENANCES SHALL BE INSPECTED BY THE CONSTRUCTION INSPECTOR. APPROVAL SHALL NOT RELIEVE THE CONTRACTOR FOR CORRECTION OF ANY DEFICIENCIES AND/OR FAILURES AS DETERMINED BY SUBSEQUENT TESTING AND INSPECTION.

7. THE CONTRACTOR SHALL PROVIDE TEMPORARY TAPS AND BLOW-OFFS AND THRUST RESTRAINTS AS REQUIRED TO FACILITATE TESTING OF PIPELINES. AT COMPLETION, REMOVE TEMPORARY TEST TAPS AND REPLACE WITH PERMANENT STAINLESS STEEL PLUGS.

8. CONTRACTOR SHALL MAKE ALL ARRANGEMENTS NECESSARY TO OBTAIN SUFFICIENT WATER, POWER AND LIGHTING FOR CONSTRUCTION PURPOSES.

9. RESTRAIN ALL DUCTILE IRON PIPING, MECHANICAL JOINT VALVES, TEES, BENDS, COUPLINGS AND FITTINGS. RESTRAIN PVC PIPING IN ACCORDANCE WITH DRAWINGS.

10. WORK IDENTIFIED ON THESE PLANS AND ASSOCIATED CONSTRUCTION DOCUMENTS INCLUDE WORK ON AN EXISTING PUBLIC SANITARY SEWER SYSTEM. THE EXISTING SANITARY SEWER SYSTEM AND COMPONENTS MUST REMAIN IN OPERATION AT ALL TIMES. SANITARY SEWER FLOW IS CONTINUOUS AND CANNOT BE TURNED OFF.

11. CONTRACTOR SHALL NOT REMOVE ANY TREES UNLESS INDICATED ON PLANS OR DIRECTED BY ENGINEER.

EROSION CONTROL NOTES

1. EROSION CONTROL MEASURES SHALL BE TAKEN BY THE CONTRACTOR DURING CONSTRUCTION TO PREVENT THE MIGRATION OF SILT AND DEBRIS. EROSION CONTROL BEST MANAGEMENT PRACTICES SHALL BE IN COMPLIANCE WITH THESE CONTRACT DOCUMENTS AND WITH THE CITY OF LACEY 2016 STORMWATER DESIGN MANUAL.

2. THE TEMPORARY EROSION CONTROL SYSTEM SHALL BE INSTALLED PRIOR TO ALL OTHER CONSTRUCTION AND SHALL BE MAINTAINED IN A SATISFACTORY CONDITION UNTIL CLEARING AND/OR CONSTRUCTION IS COMPLETED. PERMANENT DRAINAGE FACILITIES ARE OPERATIONAL AND THE POTENTIAL FOR EROSION HAS PASSED.

VERTICAL DATUM NGVD 29

CITY OF LACEY BM#1318
MAG NAIL W/FLASHER ON EAST SIDE
GOLF CLUB RD SE, 18' S. OF CL
CHAMBERS LAKE DR SE, 23' S. OF SSMH
ELEV.=199.600

3/2021
DATE OF SURVEY

The Topographic Survey depicts the physical features that were visible at the time of the survey. The City of Lacey is not responsible for the location of underground utilities that are marked or not marked in the field by other utility providers. All feature locations should be independently verified prior to design or construction.

LIFT STATION INSTALLATION GENERAL NOTES

1. ANY CONSTRUCTION CHANGES TO THE LIFT STATION DESIGN SHALL FIRST BE REVIEWED AND APPROVED BY THE PROJECT ENGINEER AND THE CITY OF LACEY.

2. CONTRACTORS SHALL BE RESPONSIBLE FOR CLEANUP OF ANY DEBRIS IN THE WET WELL, TANKS, VAULTS AND SITE ASSOCIATED WITH THE PROJECT PRIOR TO START UP.

3. PRIOR TO BACKFILL, ALL MAINS, TANKS, WET WELL, ELECTRICAL CONDUITS (ELECTRICAL CONDUIT INSPECTION SHALL BE COORDINATED THROUGH THE CITY INSPECTOR WITH THE CITY MAINTENANCE DEPARTMENT) AND VAULTS SHALL BE INSPECTED AND APPROVED BY THE CITY OF LACEY CONSTRUCTION INSPECTOR. APPROVAL SHALL NOT RELIEVE THE CONTRACTOR FOR CORRECTION OF ANY DEFICIENCIES AND/OR FAILURES AS DETERMINED BY SUBSEQUENT TESTING AND INSPECTIONS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONTACT CITY OF LACEY TO REQUEST THE REQUIRED INSPECTIONS.

4. THE CONTRACTOR SHALL COORDINATE POWER SERVICE WITH SERVING UTILITIES AND MAKE ARRANGEMENTS FOR POWER SERVICE CONNECTION.

5. ALL PIPE AND FITTINGS IN THE WET WELL SHALL BE DUCTILE IRON THICKNESS CLASS 52. DUCTILE IRON PIPE AND FITTINGS SHALL BE EPOXY LINED AND POLYETHYLENE COATED. ALL BOLTS, FASTENERS, BRACKETS AND HARDWARE IN THE WET WELL SHALL BE 316 STAINLESS STEEL.

6. **PRIOR** TO TESTING AND START-UP OF THE LIFT STATION, TWO HARD COPIES ALONG WITH AN ELECTRONIC COPY OF THE OPERATION AND MAINTENANCE MANUAL, SHALL BE SUBMITTED TO THE CITY FOR REVIEW AND APPROVAL.

7. THE CONTRACTOR, AT ITS OWN EXPENSE, SHALL ARRANGE FOR AN AUTHORIZED FACTORY-TRAINED REPRESENTATIVE OF THE COMPANY OR COMPANIES SUPPLYING THE VARIOUS ITEMS OF EQUIPMENT TO CHECK THE INSTALLATION, ADJUST AND TEST THE EQUIPMENT FURNISHED BEFORE THE ACCEPTANCE OF THE WORK BY THE CITY. THE FACTORY REPRESENTATIVE SHALL BE RESPONSIBLE TO CHECK AND RESOLVE ANY UNACCEPTABLE VIBRATION OF THE PUMP ASSEMBLIES. FURTHERMORE, THE CONTRACTOR'S REPRESENTATIVE(S) SHALL ASSIST AND INSTRUCT THE CITY'S OPERATING STAFF IN ADJUSTING AND OPERATING THE EQUIPMENT DURING THE INITIAL START-UP PERIOD. SAID REPRESENTATIVE SHALL BE EXPERIENCED AND KNOWLEDGEABLE OF THE EQUIPMENT BEING TESTED. PRIOR TO THE START UP BEING REQUESTED, THE CONTRACTOR SHALL CONDUCT A SUCCESSFUL PRE-START UP. THE PRE-START UP SHALL INCLUDE CALIBRATION AND TESTING OF ALL EQUIPMENT ON THE PRE-START UP CHECKLIST.

8. AN INSTRUCTION PROGRAM SHALL BE HELD FOR CITY PERSONNEL AT THE CONTRACTOR'S EXPENSE. CONTRACTOR SHALL FURNISH THE SERVICES OF QUALIFIED INSTRUCTORS FROM THE VARIOUS EQUIPMENT MANUFACTURERS. PROGRAM SHALL COVER BASIC SYSTEM OPERATION THEORY, ROUTINE MAINTENANCE AND REPAIR, AND "HANDS ON" OPERATION OF EQUIPMENT. TRAINING SHALL NOT PROCEED UNTIL ALL OPERATION AND MAINTENANCE MANUALS ARE COMPLETE AND ACCEPTED BY THE CITY.

9. CONTRACTOR IS RESPONSIBLE TO CONSTRUCT AND START UP A COMPLETE AND TROUBLE-FREE SYSTEM. ALL CONSTRUCTION DEFECTS DISCOVERED DURING START UP OR THE WARRANTY PERIOD STATED IN THE AGREEMENT WITH THE CITY SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE. THE CITY WILL NOT ACCEPT ANY FACILITY UNTIL SUCCESSFUL FULL OPERATION OF ALL COMPONENTS HAS BEEN DEMONSTRATED. THE CONTRACTOR SHALL CONDUCT A PRE-START UP WITHOUT CITY STAFF TO VERIFY PROPER OPERATION OF ALL LIFT STATION COMPONENTS PRIOR TO SCHEDULING A START UP WITH CITY OF LACEY STAFF.

10. CONTRACTOR SHALL LUBRICATE ALL EQUIPMENT AS REQUIRED BY THE PART OR COMPONENT MANUFACTURER.

11. WET WELL SHALL HAVE A RAIL SYSTEM INSTALLED PER LACEY STANDARD 7C.050 PRIOR TO START UP AND ACCEPTANCE.

12. LIFT STATION AND GENERATOR, SITE, DRIVEWAY, ACCESS, CONCRETE AREAS, LIGHTING AND WATER SERVICE SHALL ALL BE COMPLETED PRIOR TO START UP AND INSPECTION REQUEST.

13. GENERATOR AND FUEL STORAGE TANK SHALL BE MOUNTED ON CONCRETE PAD. THE FUEL TANK SHALL BE FULL OF FUEL AT THE TIME OF START-UP. GENERATOR SHALL HAVE WEATHER PROOF, SOUND DAMPENING ENCLOSURE; BLOCK HEATER; BATTERY CHARGER; AUTO EXERCISER; RADIATOR LOUVERS OR PROTECTION; AND SHALL COMPLY WITH ALL REQUIREMENTS IN CHAPTER 7C.070.

14. TELEMETRY SET UP, INCLUDING REVISION OF TELEMETRY COMPUTER MONITORS AT THE MAINTENANCE SERVICE CENTER, SHALL BE COORDINATED WITH CITY PROGRAMMER. SET UP SHALL BE COMPLETED PRIOR TO START UP REQUEST AND ACCEPTANCE.

15. THE FOLLOWING ITEMS SHALL BE PROVIDED FOR THE STATION AT TIME OF STARTUP ACCEPTANCE.

- ONE SPARE PUMP AND MOTOR ASSEMBLY
- ONE ADJUSTABLE WEAR LINER
- ONE COMPLETE RE-BUILD KIT FOR EACH PUMP AND MOTOR
- CERTIFIED PUMP PERFORMANCE TESTING
- ARC FLASH AND SHORT CIRCUIT CALCULATIONS AND ARC FLASH LABELING FOR PANEL, GENERATOR, AND DISCONNECTS

ADDITIONALLY, ANY SPECIAL TOOLS SPECIFIC TO THE PUMP MANUFACTURER SHALL BE PROVIDED TO THE CITY OF LACEY AT START UP.

16. DUPLICATE PUMP AND MOTOR DATA PLATES SHALL BE PROVIDED TO THE CITY OF LACEY AT THE TIME OF START-UP. ACCEPTANCE OF THE PUMPS WILL BE CONTINGENT UPON FACTORY TEST DATA CONFORMANCE WITH DESIGN PERFORMANCE DATA. CONTRACTOR SHALL BE REQUIRED TO REMOVE PUMPS FROM WET WELL FOR INSPECTION AT TIME OF START-UP.

17. THE CONTRACTOR SHALL PROVIDE TEST DATA FROM A STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER FOR ALL BACKFLOW DEVICES ON SITE PRIOR TO THE START UP.

18. A COMPACTION REPORT SHALL BE PROVIDED TO THE CITY INSPECTOR FOLLOWING WET WELL AND VALVE VAULT BACKFILL.

19. CHECK VALVES SHALL BE SEWER RATED BRONZE ON BRONZE STYLE SEAT WITH AN OUTSIDE LEVER AND SPRING. VALVES SHALL BE COATED BY THE MANUFACTURER ON THE INSIDE AND OUTSIDE WITH THE MANUFACTURERS EPOXY COATING RATED FOR SEWER. CHECK VALVES SHALL BE ORDERED AND INSTALLED IN THE VAULT AS ONE RIGHT HAND AND ONE LEFT HAND MODEL WITH THE OUTSIDE LEVERS FURTHEST AWAY FROM EACH OTHER (OUTSIDE OF PIPING CONFIGURATION). THE VALVE VAULT EMERGENCY BY-PASS PUMPING CONNECTIONS SHALL BE 6 INCH 316 STAINLESS STEEL MALE CAM LOCK STYLE FITTINGS. FITTINGS SHALL HAVE AN STAINLESS FEMALE CAP INSTALLED. CAM LOCK FITTINGS SHALL FACE "UP" AS SHOWN ON THE DETAIL AND CLEARLY VISIBLE AND ACCESSIBLE FOR CONNECTION WITH 6 INCH BY-PASS HOSE FROM ABOVE.

20. ISOLATION VALVES IN THE VALVE VAULT SHALL BE FULL PORT ROUND 100 PERCENT OPENING PLUG VALVES: CRISPIN, PRATT OR MILLIKEN. VALVES SHALL BE EPOXY COATED ON BOTH THE INSIDE AND OUTSIDE A MINIMUM OF 10 MILS THICK WITH A COATING APPROVED FOR SEWER. 4 INCH VALVES SHALL HAVE A HAND LEVER SUPPLIED FOR EACH VALVE. 6 INCH AND LARGER VALVES SHALL HAVE GEAR REDUCTION OPERATION WITH HAND WHEELS.

21. THE BUILDERS FACILITY INTEGRATOR SHALL BE MANUFACTURED AND TESTED AT THE BUILDERS FACILITY INTEGRATOR MANUFACTURER'S FACILITY. AFTER MANUFACTURER HAS VERIFIED THE BUILDERS FACILITY INTEGRATOR IS FULLY FUNCTIONAL, THE INSPECTOR SHALL BE NOTIFIED AND A CITY WITNESSED BUILDERS FACILITY INTEGRATOR FACTORY TEST SHALL BE SCHEDULED AND COMPLETED BEFORE SHIPMENT OF THE CONTROL PANEL. THE CONTROL PANEL SHALL NOT BE SHIPPED FROM THE BUILDERS FACILITY INTEGRATOR MANUFACTURER'S FACILITY PRIOR TO WRITTEN VERIFICATION OF TESTING FROM THE CITY.

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NO.	DATE	BY	REVISION

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CITY OF LACEY

CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

NOTES

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
G-4
4 of 51

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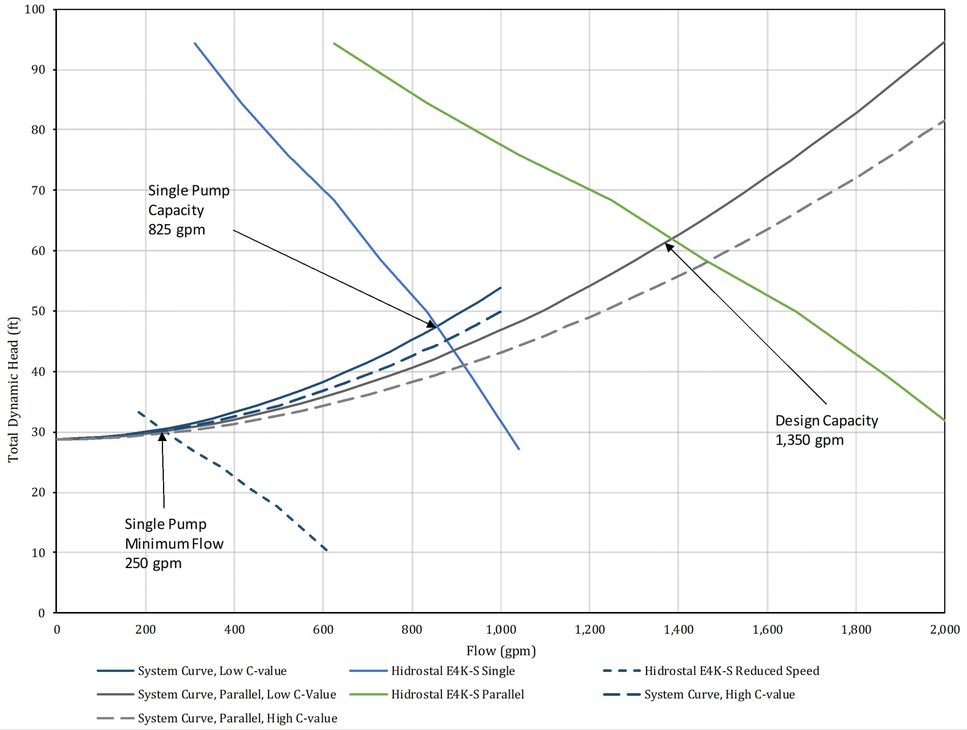

NOTE: PUMP CURVES BASED ON MANUFACTURER INTO FOR HIDROSTAL MODEL E4K-S

PUMP & SYSTEM HEAD - CAPACITY CURVES

LIST STATION 3 SYSTEM & PUMP CURVES

PUMP STATION	
LOCATION	4406 26TH AVE SE, LACEY, WA, 98503
PUMP STATION TYPE	TRIPLEX SUBMERSIBLE
PUMP TYPE	VARIABLE SPEED NON CLOG SCREW IMPELLER
DESIGN PEAK HOURLY INFLUENT FLOW	1350 GPM
PUMP CAPACITY (PARALLEL OPERATION, PER PUMP) AT 100% OF RATED SPEED	675 GPM @ 55' TDH
PUMP CAPACITY (SINGLE PUMP) AT 100% OF RATED SPEED	825 GPM @ 46' TDH
MAXIMUM PUMP STARTS PER HOUR, PER PUMP	15
MOTOR HORSEPOWER, HP	20 HP
WET WELL LEVEL MEASUREMENT SENSOR	ULTRASONIC
WET WELL OPERATING VOLUME, PUMPS OFF TO LEAD PUMP ON	2,100 GALLONS
OVERFLOW POINT/OVERFLOW ELEVATION	WET WELL RIM, 26TH AVE SE 199.5
AUXILIARY POWER TYPE	STATIONARY DIESEL GENERATOR
AUXILIARY POWER LOCATION	ONSITE
AUXILIARY POWER OUTPUT	80 KW
AUXILIARY POWER FUEL TANK CAPACITY (FULL)	425 GALLONS (APPROX 48 HOURS RUN-TIME)
AUXILIARY POWER TRANSFER SWITCH	AUTOMATIC
ALARM TELEMETRY TYPE	RADIO AND CELLULAR
EPA RELIABILITY CLASS	CLASS 1

DESIGN DATA SUMMARY TABLES

FORCE MAIN DISCHARGE PIPING			
PIPE SIZE	6 INCHES	10 INCHES	10 INCHES
PIPE MATERIAL	DI	DI	PVC
PIPE LENGTH	36 FEET	5 FEET	1800 FEET
C-VALUE	120-140	120-140	130-150
CUMULATIVE K-VALUE BY PIPE SECTION	4.7000	0.4000	1.6500

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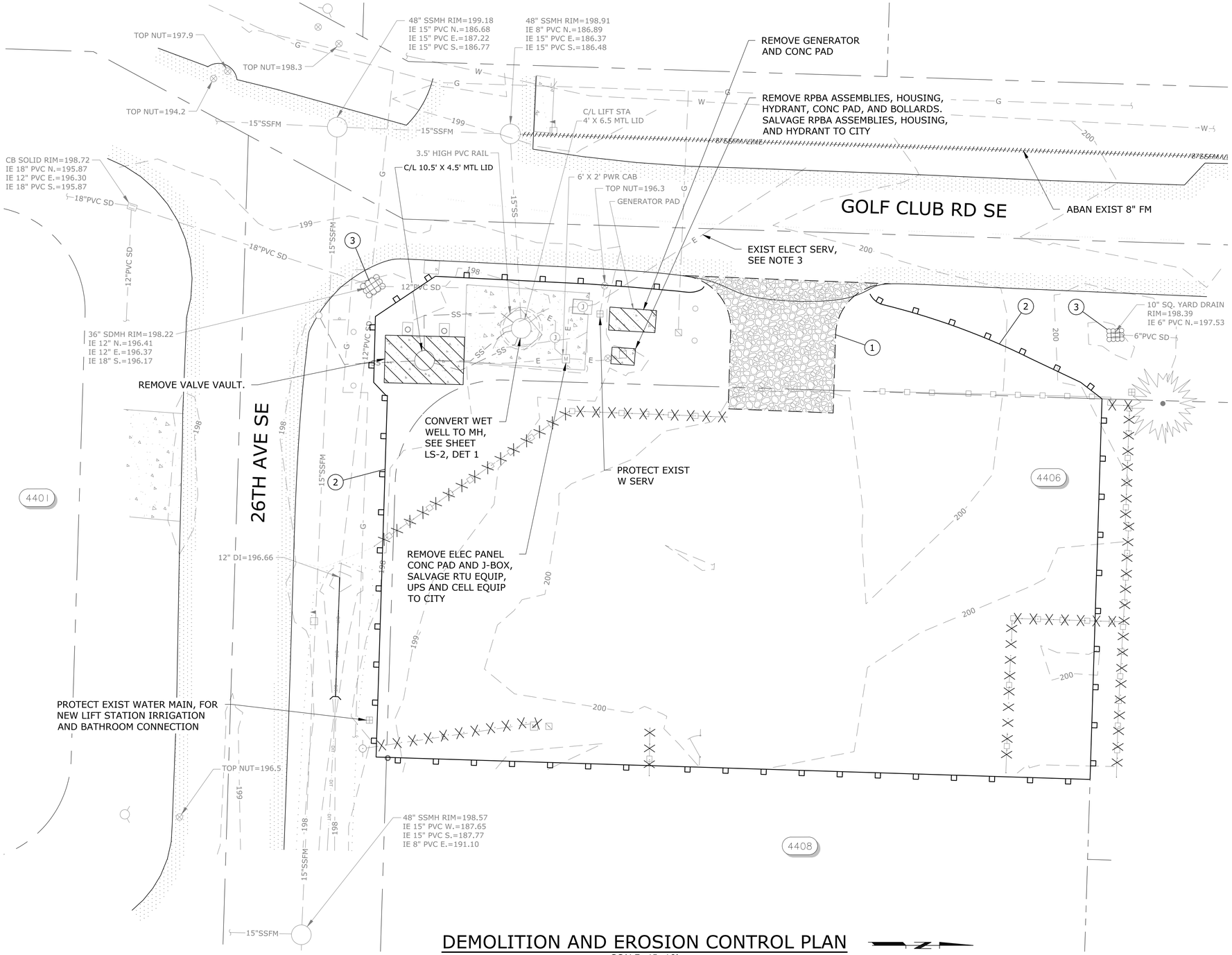
DESIGN DATA TABLE & LEGEND

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
G-5
5 of 51



DEMOLITION AND EROSION CONTROL PLAN

SCALE: 1"=10'

ESC KEY NOTES:

1. INSTALL STABILIZED CONSTRUCTION ENTRANCE PER SHEET LS-2, DETAIL 2.
2. INSTALL HIGH VISIBILITY SILT FENCE PER SHEET LS-2, DETAIL 3.
3. INSTALL STORM DRAIN INLET PROTECTION PER SHEET LS-2, DETAIL 4.

ESC LEGEND

- SILT BAG/INLET PROTECTION
- SILT FENCE
- REMOVE/DEMOLISH
- CONSTRUCTION ENTRANCE
- DEMOLITION

DEMOLITION NOTES:

1. LIFT STATION REPLACEMENT AND PIPELINE CONSTRUCTION REQUIRED DETAILED PLANNING OF CONSTRUCTION SEQUENCING, SPECIAL COORDINATION AND COMPREHENSIVE PROGRAMMING, COMBINED WITH OTHER SPECIAL WORK ACTIVITIES. CONTRACTOR SHALL PREPARE AND SUBMIT A DETAILED WORK SEQUENCE PLAN TO THE ENGINEER FOR REVIEW BEFORE CONSTRUCTION ACTIVITIES BEGIN.
2. THE EXISTING PUMP STATION FACILITIES SHALL BE REMOVED FROM SERVICE AND DEMOLISHED ACCORDING TO THESE CONTRACT DRAWINGS AND SPECIFICATIONS.
3. COORDINATE ELECTRICAL SERVICE ABANDONMENT WITH PUGET SOUND ENERGY.
4. RESTORE SHOULDER AREA FOLLOWING DEMOLITION ACTIVITIES WITH CRUSHED ROCK FOR SHOULDER GRADING.
5. REMOVE EXISTING PIPING, CONDUIT AND CONDUCTORS TO A MINIMUM OF 3' BELOW EXIST GRADE IN CONJUNCTION WITH THE ELECTRICAL PANEL, GENERATOR AND RPBA DEMOLITION.

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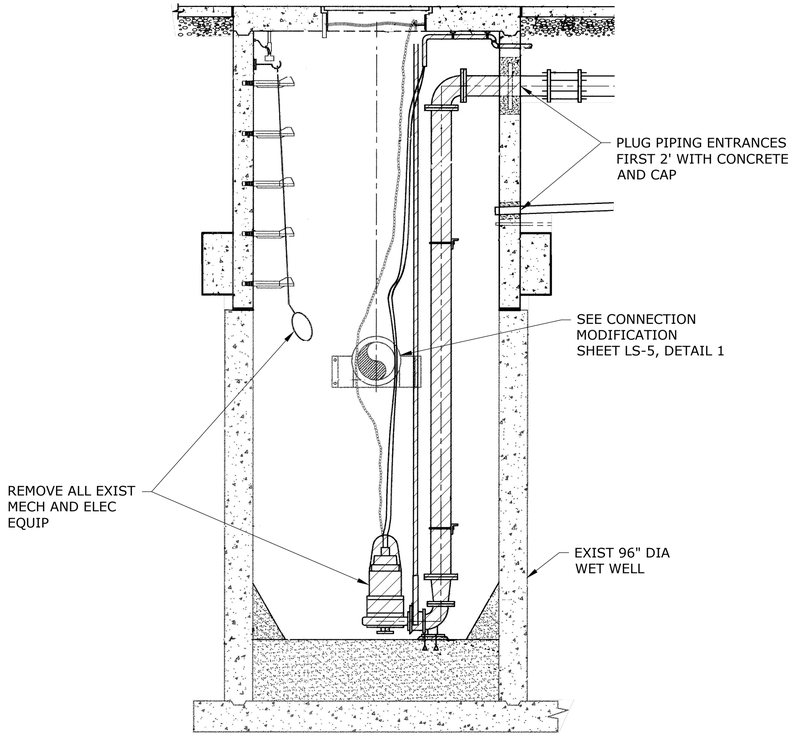
EXISTING LIFT STATION SITE DEMOLITION & EROSION CONTROL PLAN

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
LS-1
6 of 51



DEMOLITION NOTES:

1. LIFT STATION REPLACEMENT AND PIPELINE CONSTRUCTION REQUIRES DETAILED PLANNING OF CONSTRUCTION SEQUENCING, SPECIAL COORDINATION AND COMPREHENSIVE PROGRAMMING, COMBINED WITH OTHER SPECIAL WORK ACTIVITIES. CONTRACTOR SHALL PREPARE AND SUBMIT A DETAILED WORK SEQUENCE PLAN TO THE ENGINEER FOR REVIEW BEFORE CONSTRUCTION ACTIVITIES BEGIN.

2. THE EXIST PUMP STATION FACILITIES SHALL BE REMOVED FROM SERVICE AND DEMOLISHED ACCORDING TO THESE CONTRACT DRAWINGS AND SPECIFICATIONS AFTER ACCEPTANCE BY OWNER OF NEW LIFT STATION.

3. COORDINATE ELECTRICAL SERVICE DISCONNECT FOR THE EXIST LIFT STATION AFTER NEW STATION IS IN SERVICE WITH PUGET SOUND ENERGY.

4. REMOVE EXIST PIPING, CONDUIT AND CONDUCTORS TO A MINIMUM OF 3' BELOW EXIST GRADE IN CONJUNCTION WITH THE ELECTRICAL PANEL, GENERATOR AND RPBA DEMOLITION.

5. SEE DETAIL 1, SHEET LS-8 FOR ADDITIONAL MODIFICATIONS.

EXIST WET WELL DEMOLITION SECTION

SCALE: NTS

1 / LS-1

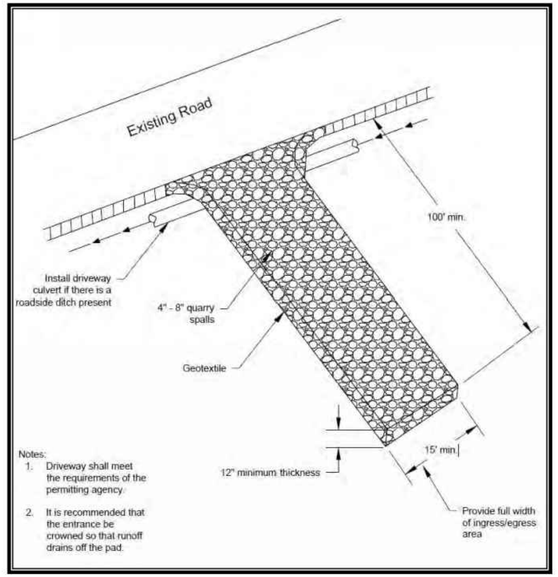


Figure 5.1. Stabilized Construction Entrance.

STABILIZED CONSTRUCTION ENTRANCE

SCALE: NTS

2 / LS-1

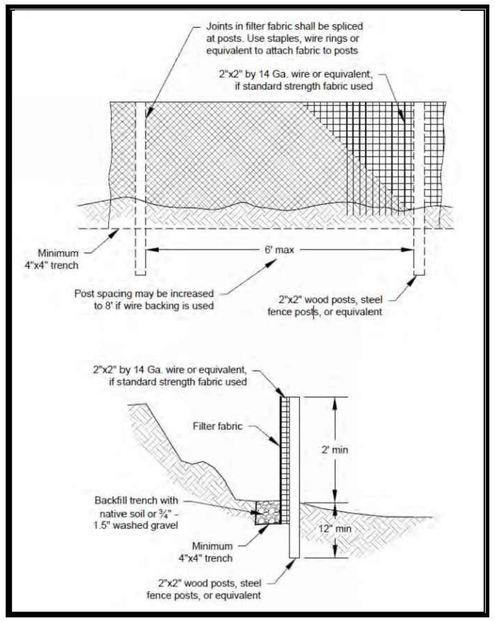
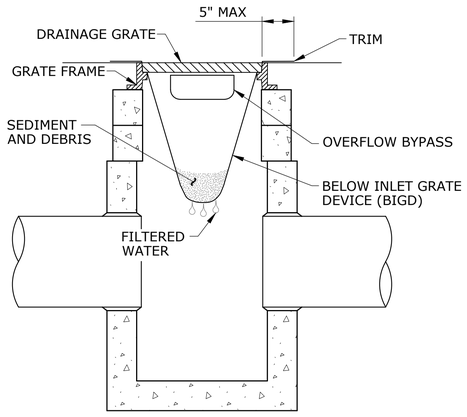


Figure 5.20. Silt Fence.

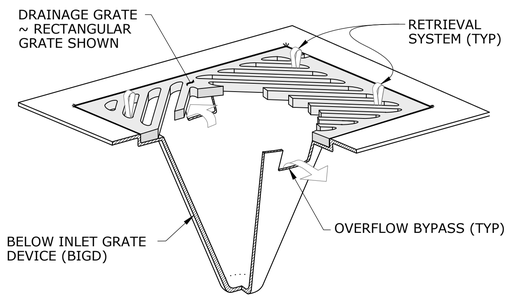
SILT FENCE

SCALE: NTS

3 / LS-1



SECTION VIEW



ISOMETRIC VIEW

NOTES:

1. SIZE THE STORM DRAIN INLET PROTECTION FOR THE STORM WATER STRUCTURE IT WILL SERVICE.

2. THE STORM DRAIN INLET PROTECTION SHALL HAVE A BUILT-IN HIGH-FLOW RELIEF SYSTEM (OVERFLOW BYPASS).

3. THE RETRIEVAL SYSTEM MUST ALLOW REMOVAL OF THE BELOW INLET GRADE DEVICE WITHOUT SPILLING THE COLLECTED MATERIAL.

4. PERFORM MAINTENANCE IN ACCORDANCE WITH DEPARTMENT OF ECOLOGY BMP C220.

STORM DRAIN INLET PROTECTION

SCALE: NTS

4 / LS-1

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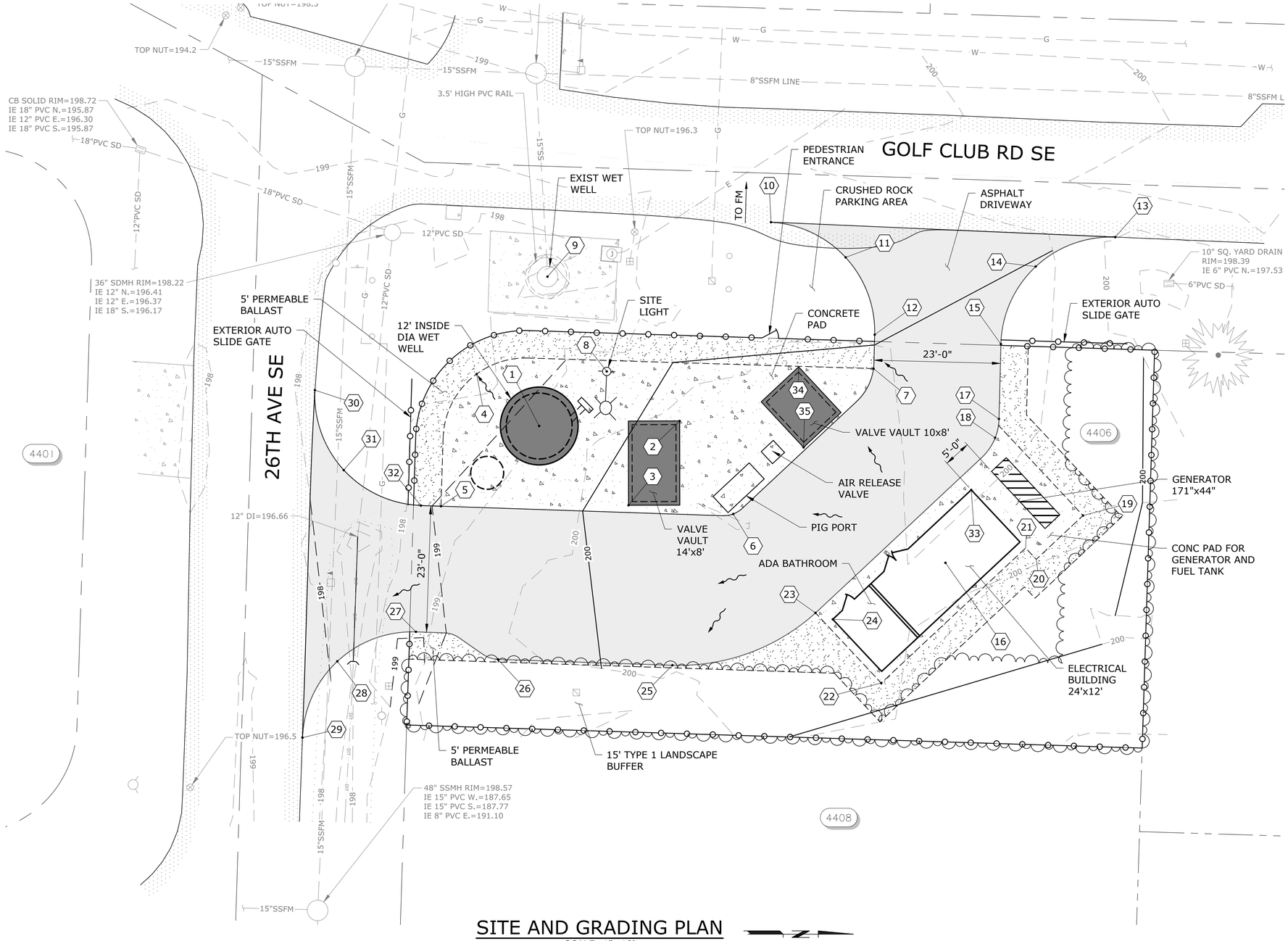
DEMOLITION DETAILS & NOTES

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET **LS-2**



SITE AND GRADING PLAN

SCALE: 1"=10'

GRADING POINTS

PT NO.	DESCRIPTION	NORTHING	EASTING	ELEVATION
1	CENTER WET WELL	N625464.54	E59889.84	199.60
2	NW EXT CORNER VAULT	N625490.12	E59888.92	200.07
3	SE EXT CORNER VAULT	N625480.81	E59904.27	200.07
4	SW CORNER OF CONC, RAD 15'	N625451.78	E59881.53	198.42
5	SE CORNER OF CONC	N625446.65	E59904.45	198.82
6	NE CORNER OF CONC, RAD 5'	N625499.88	E59905.86	199.52
7	NW CORNER OF CONC	N625525.43	E59879.39	199.90
8	SITE LIGHT POLE	N625476.84	E59879.91	199.28
9	CENTER OF EXIST WET WELL	N625466.05	E59862.65	198.51
10	NW DWY S @ EXIST RD	N625506.75	E59852.73	199.24
11	NW DWY S MID 20' RAD	N625520.35	E59859.14	199.20
12	NW DWY S INNER 20' RAD	N625525.64	E59873.21	199.47
13	NW DWY N @ EXIST RD	N625569.47	E59855.45	199.95
14	NW DWY N MID 20' RAD	N625554.95	E59860.81	199.46
15	NW DWY N INNER 20' RAD	N625548.61	E59874.92	200.20
16	ELECTRICAL BLDG FF	-	-	200.62
17	N EDGE ASPH, RAD 6'	N625548.26	E59888.55	200.44
18	W EDGE CONC	N625548.17	E59889.70	200.50
19	N EDGE CONC	N625563.57	E59906.14	200.50
20	NNE EDGE CONC	N625555.06	E59914.12	200.50
21	NEE EDGE CONC	N625553.13	E59912.05	200.52
22	E EDGE CONC	N625526.83	E59936.63	200.50
23	S EDGE CONC	N625514.86	E59923.86	200.50
24	S EXTERIOR CORNER OF BLDG	N625518.01	E59925.03	200.60
25	NE EDGE ASPH	N625488.80	E59933.39	199.51
26	SE EDGE OF ASPH	N625457.02	E59932.31	199.38
27	SE DWY E INNER 20' RAD	N625442.10	E59927.31	198.84
28	SE DWY E MID 20' RAD	N625427.78	E59932.67	198.32
29	SE DWY E @ EXIST RD	N625421.43	E59946.58	198.83
30	SE DWY W @ EXIST RD	N625423.70	E59883.31	198.43
31	SE DWY W MID 20' RAD	N625428.94	E59897.86	198.25
32	SE DWY W INNER 20' RAD	N625443.00	E59904.32	198.67
33	W EXTERIOR CORNER OF BLDG	N625543.21	E59901.47	200.60
34	W EXT CORNER VAULT	N625511.80	E59879.08	200.07
35	E EXT CORNER VAULT	N625512.68	E59893.73	200.07

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CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

SITE AND GRADING PLAN

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
LS-3
8 of 51

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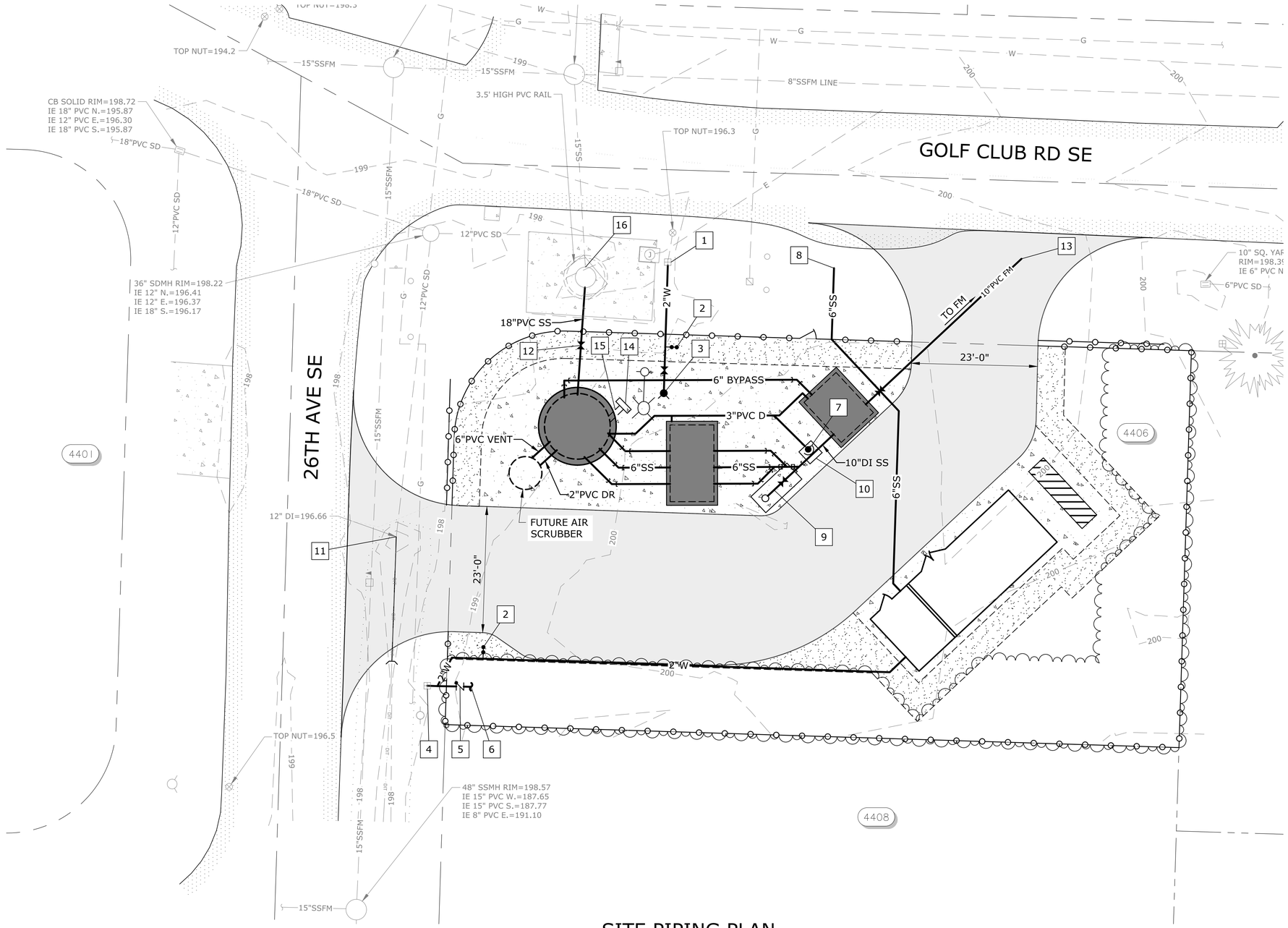

SITE PIPING PLAN
SCALE: 1"=10'

KEY NOTES:

1. CONNECT TO EXIST WATER SERVICE AND METER, FOR LIFT STATION WASH HYDRANT
2. 2" RPBA, SEE DET 1, SHT D-2
3. LIFT STATION WASH HYDRANT, SEE DET 2, SHT D-2
4. CONNECT TO EXIST WATER SERVICE, FOR IRRIGATION AND ELECTRICAL BUILDING
5. IRRIGATION DCVA, SEE DET 2, SHT D-4
6. IRRIGATION SYSTEM CONNECTION, SEE DET 3, SHT D-4
7. ROUTE 3" PVC DRAIN LINE TO ARV ENCLOSURE, FITTINGS AS REQD
8. INSTALL NEW 6" SEWER CONNECTION, SEE DET 2, SHT D-5
9. INSTALL 10" DI WYE W/ 10" PV, FLGxMJ ADAPTER AND 10" PIG LAUNCH PORT, INCLUDING 10" PV (SEE DET 1, SHT D-3) WITH TB
10. LIFT STATION 2" AIR AND VACUUM RELEASE VALVE INSTALLATION, SEE DET 2, SHT D-3. PROVIDE FITTINGS AND DISMANTLING JOINT AS REQUIRED FOR CONNECTION TO VENT PIPE
11. REPLACE EXIST STORM DRAIN PIPE UNDER NEW DRIVEWAY WITH 12" DI AND COUPLING AS REQ'D
12. INSTALL 18" GATE VALVE, MJ W/ VALVE OPERATOR EXTENSION, SEE DET 3, SHT D-3
13. CONNECT TO FM BY OTHERS
14. ISOLATION PEDESTAL, SEE DET 1, SHT D-5
15. CABLE TRENCH, SEE DET 1, SHT D-4
16. EXIST WET WELL WITH MODIFICATIONS, SEE DET 1, SHT LS-8

NOTES:

1. ALL DUCTILE IRON MECHANICAL JOINT FITTINGS, PIPE AND VALVES SHALL BE EPOXY COATED AND HAVE RESTRAINED JOINTS. FORCE MAIN FITTINGS SHALL INCLUDE THRUST BLOCKS, AS NOTED.
2. ALL PVC FORCE MAIN, INCLUDING FORCE MAIN DRAIN TO WET WELL, SHALL BE RESTRAINED JOINT PIPE.
3. PIPE TRENCH BEDDING AND BACKFILL SHALL BE IN ACCORDANCE WITH DETAIL 5 SHEET D-1.
4. INSTALL THRUST BLOCKS FOR ALL FORCE MAIN FITTINGS.
5. ALL DRAIN AND VENT PIPING SHALL BE SLOPED TO WET WELL AT 2% MIN SLOPE.
6. IRRIGATION SYSTEM NOT SHOWN FOR CLARITY, SEE LANDSCAPE PLANS.

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STATE OF WASHINGTON

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CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

SITE PIPING PLAN

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
LS-4
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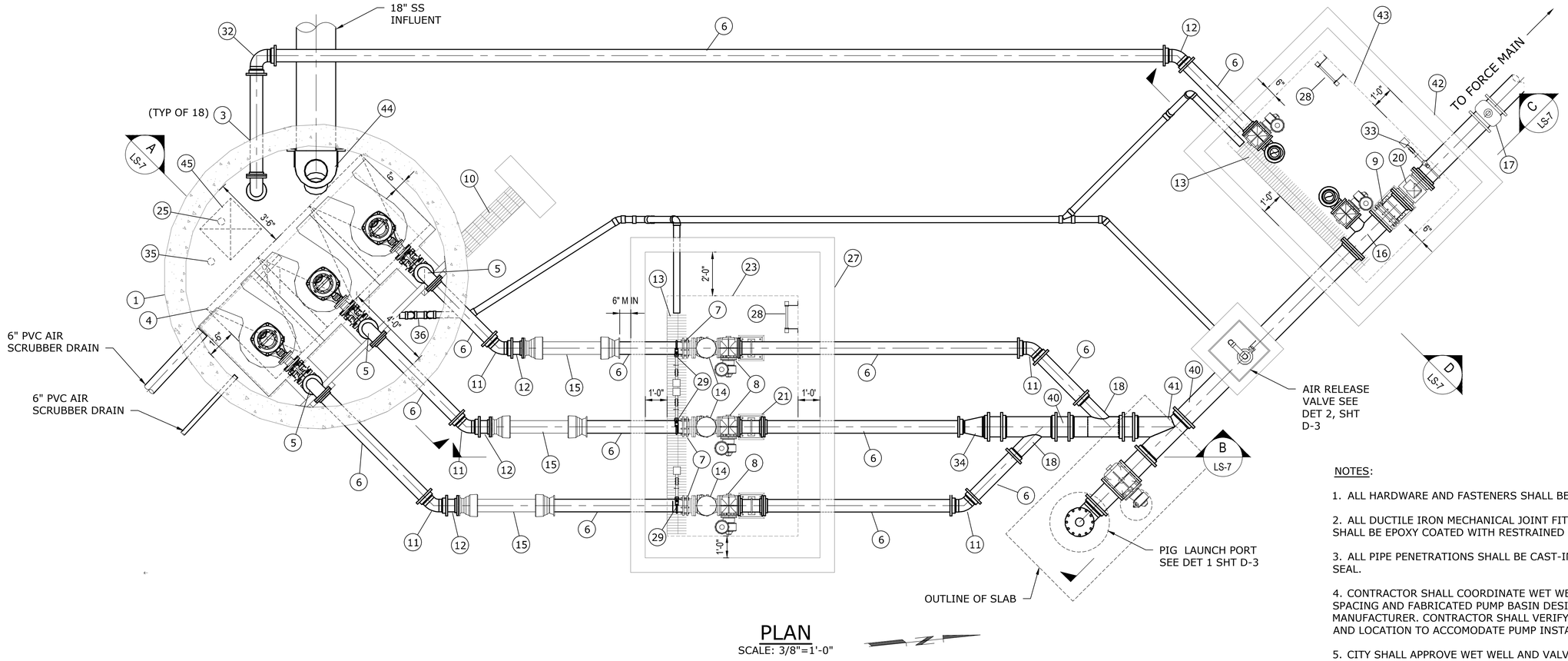

PLAN
SCALE: 3/8"=1'-0"

NOTES:

1. ALL HARDWARE AND FASTENERS SHALL BE 316 STAINLESS STEEL.
2. ALL DUCTILE IRON MECHANICAL JOINT FITTINGS, PIPE AND VALVES SHALL BE EPOXY COATED WITH RESTRAINED JOINTS.
3. ALL PIPE PENETRATIONS SHALL BE CAST-IN AND SEALED WITH LINK SEAL.
4. CONTRACTOR SHALL COORDINATE WET WELL LAYOUT, PUMP SPACING AND FABRICATED PUMP BASIN DESIGN WITH PUMP AND BASIN MANUFACTURER. CONTRACTOR SHALL VERIFY WET WELL HATCH SIZING AND LOCATION TO ACCOMODATE PUMP INSTALLATION AND REMOVAL
5. CITY SHALL APPROVE WET WELL AND VALVE VAULT STRUCTURE WALL CORE LAYOUT FOR PIPES AND CONDUITS.

MATERIAL LIST

1. 12' INSIDE DIA PRECAST CONC WET WELL AND BASE W/ SPRAY ROQ COATING IN ACCORDANCE W/ SPECS AND SHT G-4
2. SUBMERSIBLE WASTEWATER PUMP HIDROSTAL E4K-S (TYP OF 4)
3. LINK-SEAL WALL PENETRATION, SEE DET 2, SHT LS-9
4. 54" x 120" ALUM TRIPLE-LEAF ACCESS HATCH, H20 RATED, SEE DET 1, SHT LS-10
5. 6" DI 90° BEND, FLG
6. 6" DI SPL, FLG OR PE AS SHOWN, LTF
7. 6" RFCA
8. 6" EPOXY COATED PV W/ HANDWHEEL, FLG
9. 10" RFCA
10. 4"x8" WIDE TRENCH CABLE TRAY W/ PERFORATED GRIP STRUT LID, SEE DET 1, SHT D-4
11. 6" DI BEND 45°, MJ
12. 6" DI SPOOL PE x FLG
13. SUMP W/AL GRATING BY VAULT MFR
14. 6" EPOXY COATED SWING CHECK VALVE W/ LIMIT SWITCH, SEE DET 3, SHT L-9
15. 6" FLEXIBLE EXPANSION JOINTS 12" OFFSET FLG X MJ
16. 10" x 6" DI TEE, FLG
17. 10" GV, MJ
18. 10" x 6" DI WYE, MJ
19. 6" 316 SS CAMLOCK FITTING W/ CAP & INSULATING FLANGE KIT (TYP OF 2).
20. 10" FLOW METER, FLG
21. PIPE SUPPORT, STANDON MODEL S89 OR EQ, INSTALL AS NEEDED (4 MIN)
22. 4" PUMP BASE ELBOW, FLG
23. 72" x 132" ALUM DOUBLE-LEAF ACCESS HATCH SEE DET 1, SHT LS-10
24. 2" DIA SST TYPE 316 GUIDE RAIL, TYP OF 6, INSTALL AS REQ'D BY MFR
25. ULTRASONIC LEVEL TRANSDUCER, SEE SHT E-X
26. PIPE SUPPORT BRACKET, SEE DET 4, SHT LS-9 AND DET 6, SHT LS-9
27. 8' x 14' x 4' PRECAST CONC SOLID WALL VAULT, UTILITY VAULT OR APPVD EQ
28. OSHA APPVD LADDER W/ EXTENSION, SEE DET 7, DET 1, SHT LS-10
29. ½" TAP W/ SST BALL VALVE W/ 0-30 PSI GAUGE
30. FABRICATED PUMP BASIN BY PUMP MFR W/ GROUT FILL, SEE NOTE 5
31. WET WELL HATCH SAFETY RAIL, SEE DET 2, SHT LS-10
32. 6" DI 90° BEND, MJ
33. PRESSURE TRANSMITTER ASSEMBLY (0-30 PSI), SEE SHT E-X
34. 10" X 6" DI CONCENTRIC RDCR, MJ
35. HIGH LEVEL FLOAT
36. P-TRAP, SEE DET 1, SHT LS-9
37. 6" DI BASE ELBOW FLG (TYP OF 2)
38. 6" x 4" ECC DI REDUCER, FLG
39. BASE ELBOW SUPPORT (TYP OF 2) SEE SHT X, DTL X
40. 10" DI SPL, FLG x PE AS SHOWN, LTF
41. 10" DI WYE, MJ
42. 8' x 10' x 4' PRECAST CONC SOLID WALL VAULT, UTILITY VAULT OR APPROVED EQUAL
43. 72" x 108" ALUM DOUBLE-LEAF ACCESS HATCH H-20 RATED SEE DET 1, SHT LS-10
44. DROP BOWL, SEE DET 5, SHT LS-9
45. 24 x 24" ALUM SINGLE-LEAF ACCESS HATCH, H-20 RATED, SEE DET 1, SHT LS-10

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CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

WET WELL & VALVE VAULT PLAN

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
LS-6
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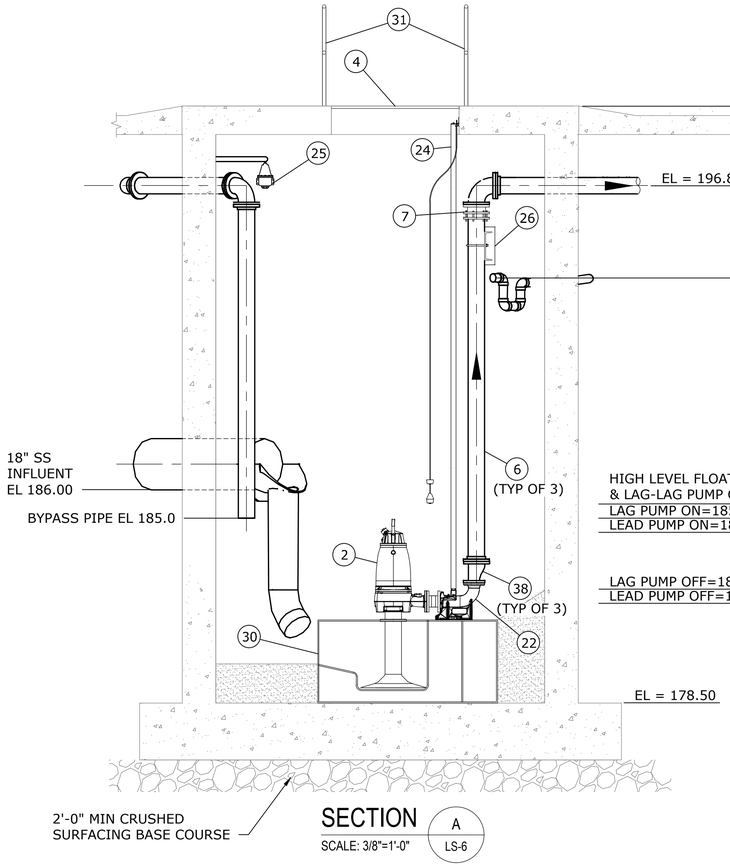
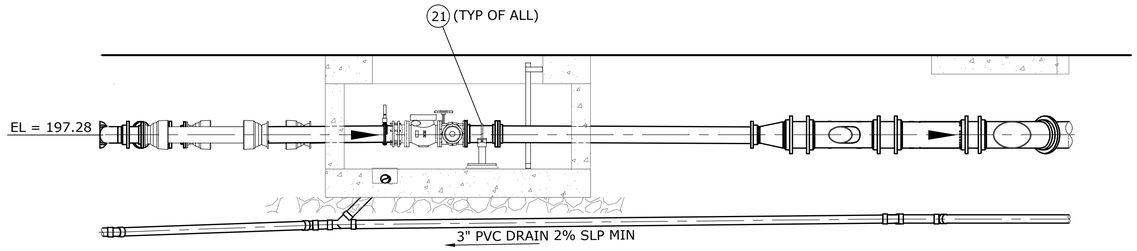
MATERIAL LIST

SEE SHT LS-6 FOR MATERIAL LIST AND NOTES.



SECTION A
SCALE: 3/8"=1'-0"



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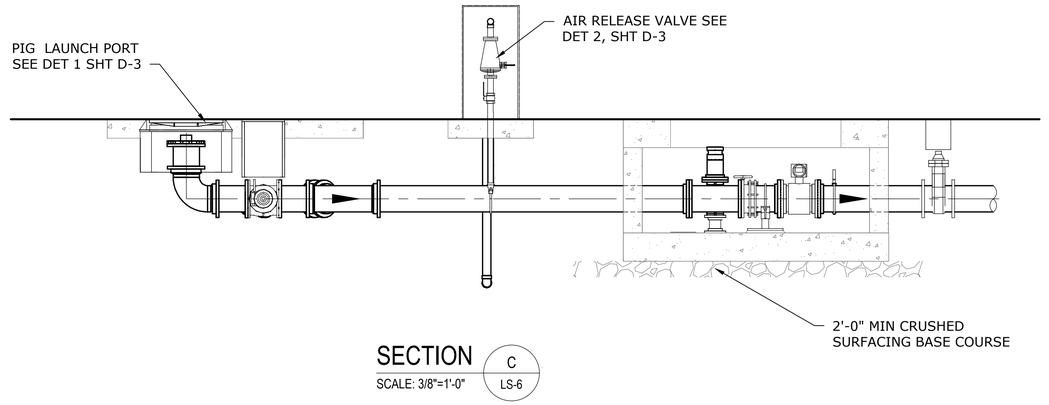
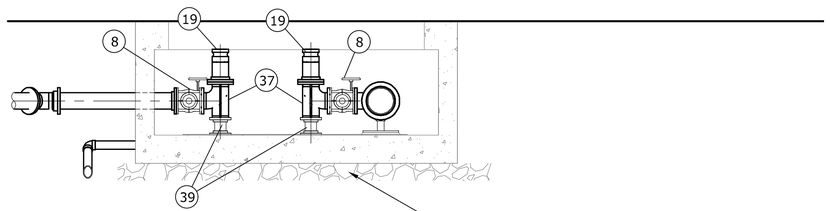


SECTION C
SCALE: 3/8"=1'-0"



SECTION D
SCALE: 3/8"=1'-0"

WET WELL LEVELS

DESCRIPTION	ELEVATION (FT)	WET WELL LEVEL (FT)
WET WELL RIM	199.50	21.00
INFLUENT SEWER	186.00	7.50
HIGH LEVEL FLOAT	185.50	7.00
LAG-LAG PUMP CALL	185.50	7.00
SCADA ALARM	185.25	6.75
BYPASS PIPE	185.00	6.50
LAG PUMP ON	185.00	6.50
LEAD PUMP ON	184.50	6.00
LAG PUMP OFF	182.50	4.00
LEAD PUMP OFF	182.00	3.50
LOW LEVEL ALARM	181.50	3.00
WET WELL BOTTOM	178.50	0.00

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WET WELL & VALVE VAULT SECTION

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
LS-7
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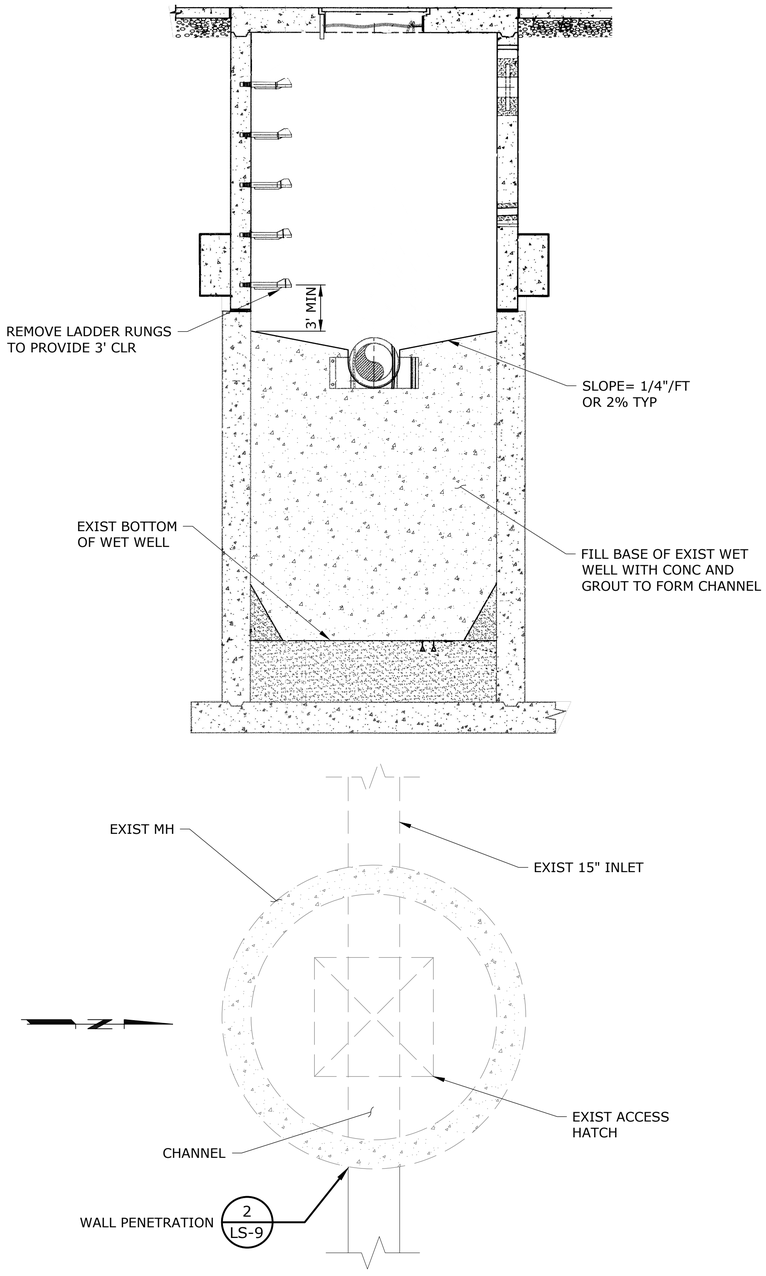

EXIST WET WELL MODIFICATIONS (1 / LS-4)

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CIVIL DETAILS

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET **LS-8**

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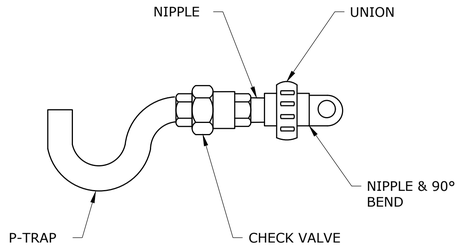
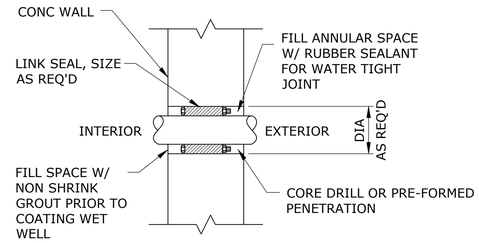


P-TRAP DETAIL

SCALE: NTS

1 / LS-6



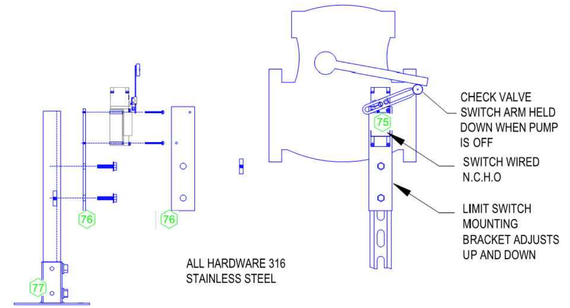
NOTE:

1. SEAL ALL WALL PIPE AND CONDUIT PENETRATIONS WITH LINK SEAL TYPE SEAL.

WALL PENETRATION

SCALE: NTS

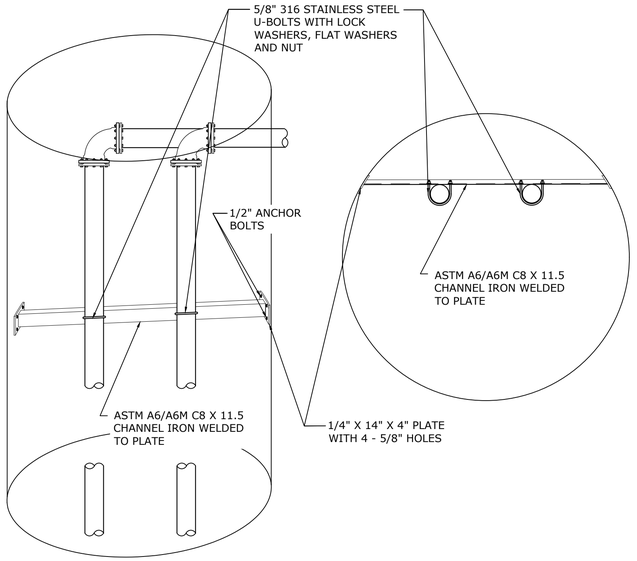
2 / LS-6 LS-8



SWING CHECK VALVE

SCALE: NTS

3 / LS-6



NOTES:

1. CHANNEL IRON SUPPORT AND BRACKETS SHALL BE COATED WITH 3M SCOTCH COAT 134 FUSION BONDED EPOXY.

2. 316 STAINLESS STEEL SUPPORT OF SAME DIMENSIONS SHOWN MAY BE SUBSTITUTED FOR EPOXY COATING IF DESIRED.

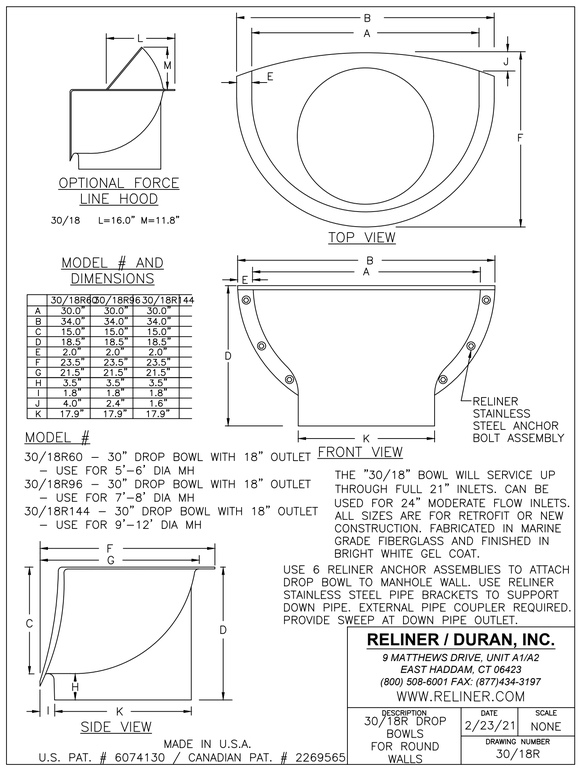
3. ALL BOLTS, ANCHORS AND FASTENERS SHALL BE 316 STAINLESS STEEL.

4. THERE SHALL BE ONE PIPE SUPPORT BAR INSTALLED FOR EACH 10' OF VERTICAL DISCHARGE PIPE. NO SUPPORTS SHALL BE INSTALLED BELOW THE LAG PUMP LEVEL.

TYPICAL LIFT STATION PUMP PIPE SUPPORT

SCALE: NTS

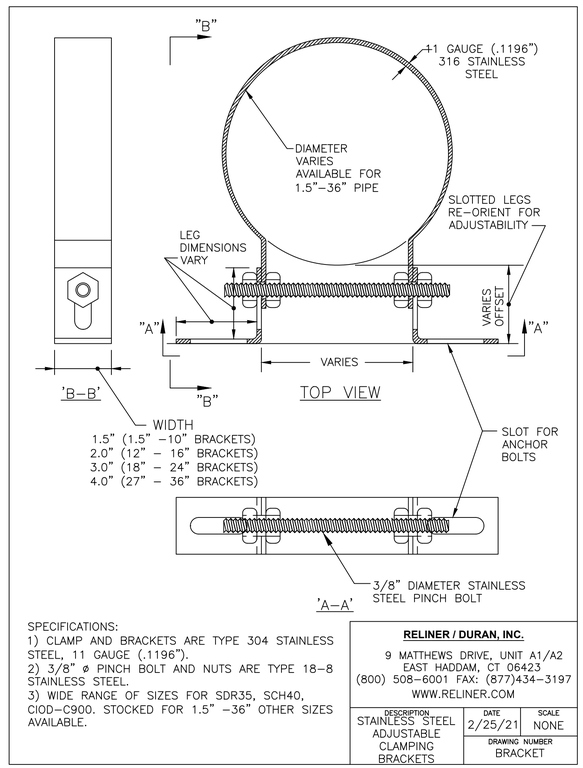
4 / LS-6 LS-7



DROP BOWL

SCALE: NTS

5 / LS-6 LS-7



PIPE BRACKETS

SCALE: NTS

6 / LS-6 LS-7

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CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

MECHANICAL DETAILS - 1

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
LS-9
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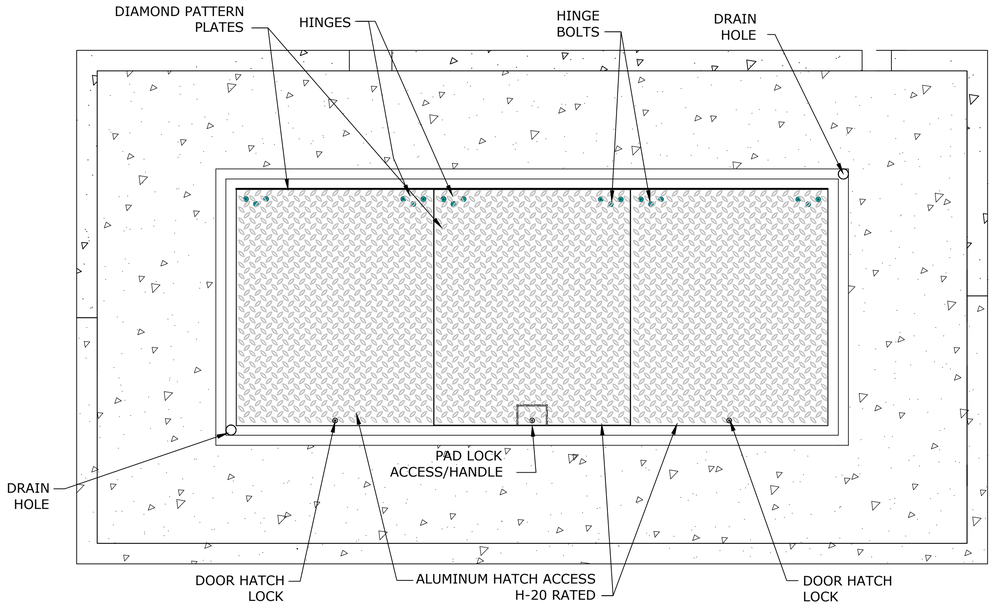


NOTES:

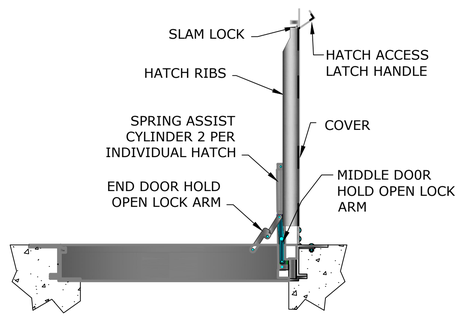
1. THE ACCESS SHALL BE LW PRODUCTS HATCH, WITH SLAM LOCK, SPRING ASSISTED CYLINDER, HOLD OPEN ARM, BEARING SHELF AND DRAIN GUTTER DESIGNED FOR H-20 LOADING.

2. THE ACCESS HATCH SHALL OPEN AS DETERMINED DURING THE REVIEW.

3. VAULT SHALL HAVE BILCO LU1 LADDER UP SAFETY POST WITH YELLOW EPOXY COATING AND MOUNTED TO THE LADDER.

4. ALL PENETRATIONS INTO THE VAULT SHALL BE CORE DRILLED AND SECURED/SEALED WITH LINK SEAL.

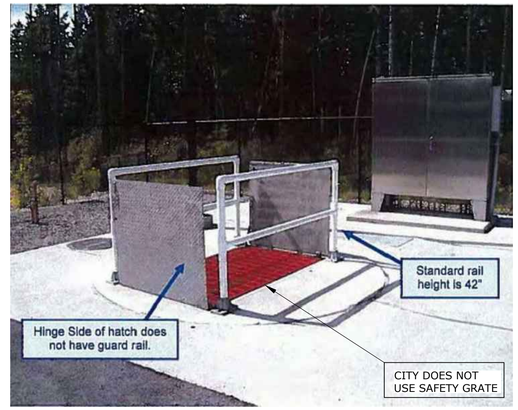
5. HATCH CLEAR OPENING SHALL BE WATER TIGHT.



ACCESS HATCH DETAIL

SCALE: NTS

1 / LS-6 → LS-7



NOTES:

1. RAILS MUST BE KEE SAFETY RAILING SOLUTIONS. SIMPLIFIED BUILDING CONCEPTS, (888) 527-2278.

2. RAILS SHALL BE STEEL, 2" DIAMETER, POWDER COATED WHITE.

3. MOUNTING BOLTS / CONCRETE, FASTENERS SHALL BE STAINLESS STEEL.

4. CITY DOES NOT USE SAFETY GRATE.

WET WELL GUARD RAIL SYSTEM

SCALE: NTS

2 / LS-6 → LS-7

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CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

MECHANICAL DETAILS - 2

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
LS-10
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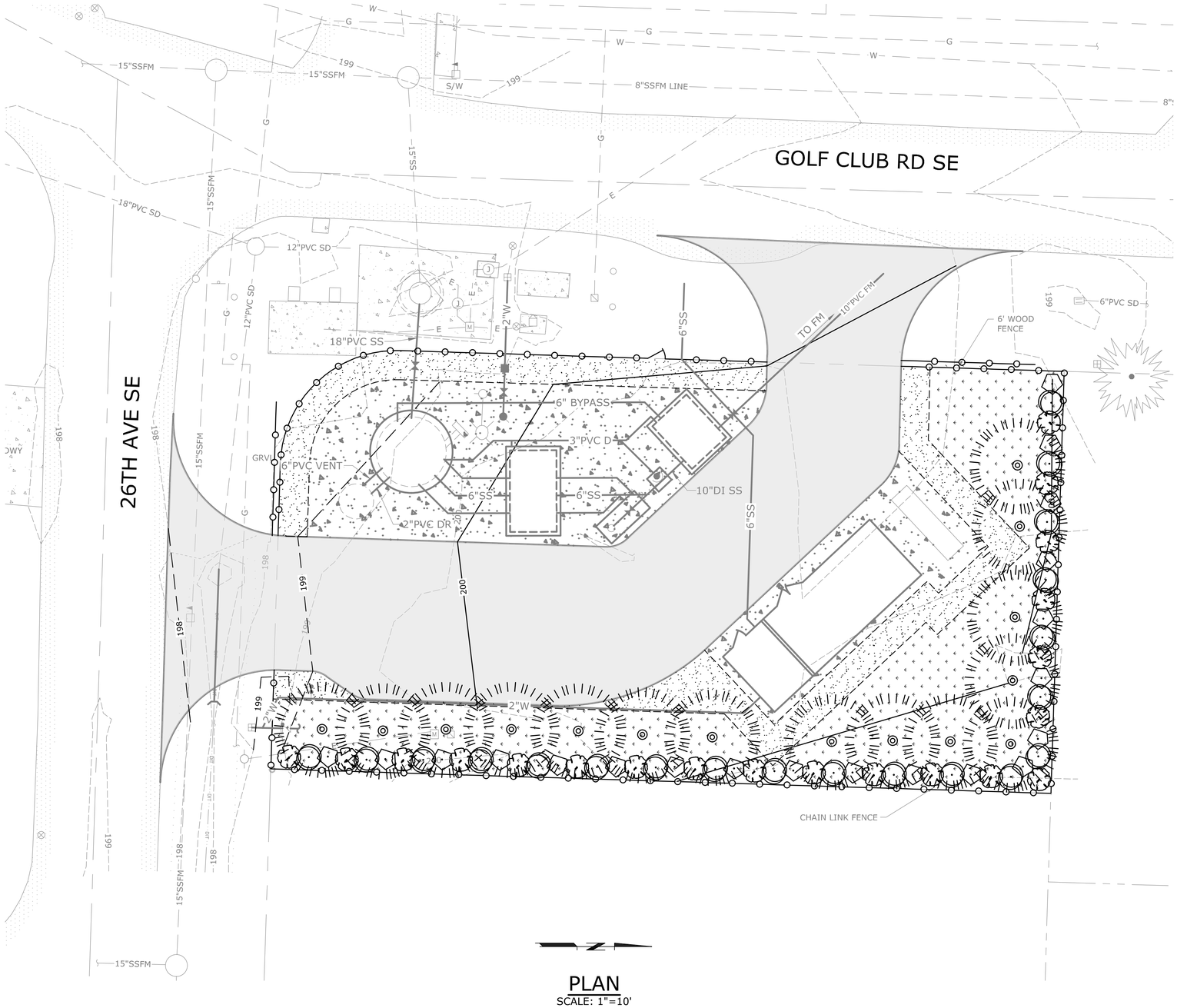

PLAN
SCALE: 1"=10'

LEGEND

SYMBOL	QUANTITY	COMMON NAME BOTANICAL NAME	PLANT TYPE	PLANTING SIZE	LOCATION
	15	YEW TAXUS BREVIFOLIA	TREE	7 FT	AS SHOWN
	20	REDOSIER DOGWOOD CORNUS SERICEA	SHRUB	2 GAL	AS SHOWN
	20	TALL OREGON GRAPE MAHONIA AQUIFOLIUM	SHRUB	2 GAL	AS SHOWN
	20	SALMONBERRY RUBUS SPECTABILIS	SHRUB	2 GAL	AS SHOWN
	3 LB	SEEDING AREA, 2761 SF SEE DETAILS, SHEET L-2			
		EXISTING TREES			

NOTE:

1. SEE PLANTING DETAILS AND LANDSCAPE MAINTENANCE NOTES AT SHEET L-2.

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PLANTING PLAN

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
L-1
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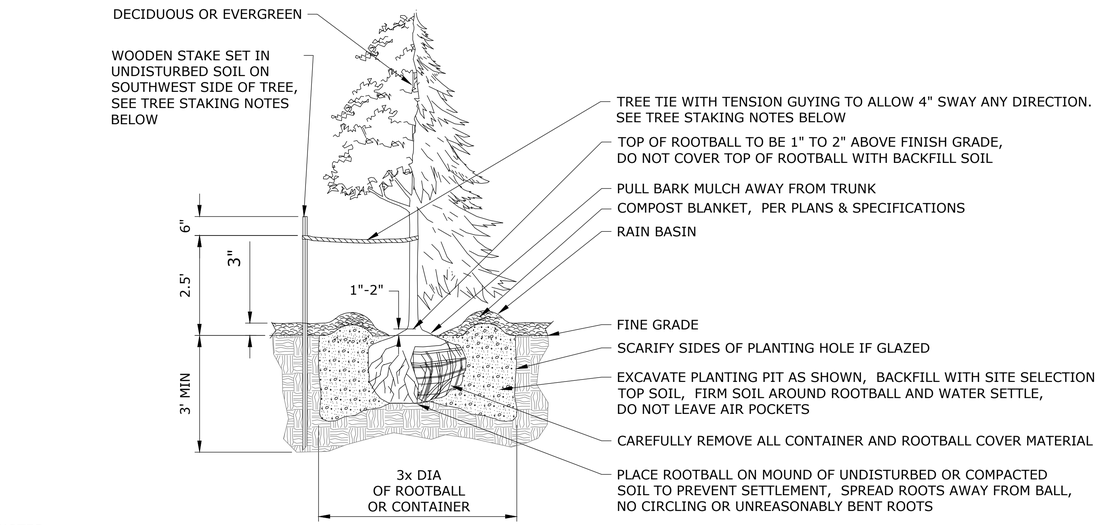


NOTES:

1. TREE TIES TO BE EITHER:

   RIGID GUY SYSTEM WITH GALVANIZED WIRE TO BE APPROXIMATELY 1/8" THICKNESS AND 24" LENGTH. THERE IS A PLASTIC SLEEVE OVER PORTION THAT GOES AROUND TREE. THE WIRE TIE IS TO GO THRU THE WOOD STAKE AND BE SECURELY FASTENED.

   PLASTIC CHAIN TYPE, APPROXIMATELY 1" WIDTH BY 1/8" DEPTH WHERE TWO STAKES ARE REQUIRED. CROSS TIES BETWEEN STAKES AND WRAP TIE AROUND TREE. FASTEN SECURELY TO STAKE.

2. EXCAVATE ALL PLANT WELLS PER DETAIL AT 3X DIAMETER OF ROOTBALL OR CONTAINER AND BACKFILL WITH SITE SELECT TOPSOIL FREE OF NOXIOUS WEEDS PLANT MATERIAL INCLUDING ROOTS AND SPRIGS.

3. FURNISH TREE STAKES ON ALL TREE PLANTINGS. STAKES TO BE CONSTRUCTION GRADE, ROUGH SAWN OR FINISHED DOUGLAS FIR OR PINE. STAIN WITH APPROVED GREEN PENETRATING OIL. STAKE SIZE IS TO BE 1 1⁄2"x1-1/2" BY FOLLOWING LENGTHS:

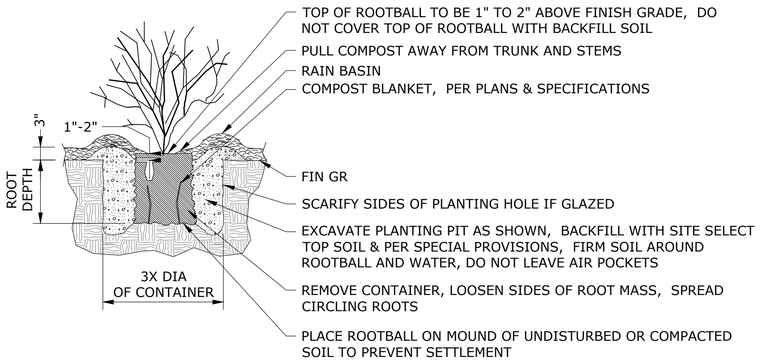
   TREES 36" AND SHORTER - USE ONE - 6' (APPROXIMATELY) STAKE

   TREES TALLER THAN 36" - USE ONE - 8' (APPROXIMATELY) STAKE

   DRIVE STAKES VERTICALLY AND AT LEAST 24" INTO UNDISTURBED SOIL. DO NOT DRIVE STAKES THRU ROOT BALL. LOCATE STAKES TO BEST RESIST PREVAILING WINDS.

TREE PLANTING DETAIL 1/-

SCALE: NTS



SHRUB PLANTING DETAIL 2/-

SCALE: NTS

PLANTING METHODS:

1. SOIL PREPARATION: TILL THE SUB-GRADE IN THESE AREAS TO A DEPTH OF AT LEAST FOUR INCHES AND ADD AT LEAST 12 INCHES OF CLEAN COMPOST-AMENDED TOPSOIL. THE COMPOST-AMENDED TOPSOIL SHALL HAVE A GOOD GROWING MEDIUM WITH TEXTURE MATERIAL THAT PASSES THROUGH ONE-INCH AND 35% ORGANIC MATTER FERTILITY.

2. PLANTING TIME: CONTAINERIZED STOCK SHALL BE INSTALLED ONLY FROM FEBRUARY 1 THROUGH MAY 1 AND OCTOBER 1 THROUGH NOVEMBER 15. PLANTINGS OUTSIDE THESE TIMES MAY REQUIRE ADDITIONAL MEASURES TO ENSURE SURVIVAL WHICH SHALL BE SPECIFIED ON THE PLANS.

3. INSTALLED PLANTS SHALL TAGGED FOR DORMANT SEASON IDENTIFICATION AND SHALL REMAIN ON PLANT MATERIALS AFTER PLANTING FOR MONITORING PURPOSES.

4. EROSION CONTROL: GRADING, SOIL PREPARATION, AND SEEDING SHALL BE PERFORMED DURING OPTIMAL WEATHER CONDITIONS AND AT LOW FLOW LEVELS TO MINIMIZE SEDIMENT IMPACTS.

5. MULCHING: TREES, SHRUBS, AND GROUNDCOVER AREAS SHALL BE MULCHED A MINIMUM OF THREE INCHES IN DEPTH AND 18 INCHES IN DIAMETER, TO RETAIN MOISTURE AND DISCOURAGE WEED GROWTH AROUND NEWLY INSTALLED PLANT MATERIAL. APPROPRIATE MULCHES ARE MADE FROM COMPOSTED BARK OR LEAVES THAT HAVE NOT BEEN CHEMICALLY TREATED.

6. WEED CONTROL: THE REMOVAL OF NON-NATIVE, INVASIVE WEEDS SHALL BE NECESSARY THROUGHOUT THE MAINTENANCE PERIOD, OR UNTIL A HEALTHY STAND OF DESIRABLE VEGETATION IS ESTABLISHED.

8. PLANT REPLACEMENT AND PRESERVATION: INSTALLED PLANTS THAT ARE UNHEALTHY OR DAMAGED SHALL BE REPLACED DURING THE MAINTENANCE PERIOD. PRIOR TO REPLACEMENT, THE CAUSE OF LOSS (WILDLIFE DAMAGE, POOR PLANT STOCK, ETC.) SHALL BE DOCUMENTED WITH A DESCRIPTION OF THE CORRECTIVE ACTIONS TAKEN.

9. IF PLANTING OCCURRED OUT OF PLANTING PERIODS INDICATED AT NOTE 2 ABOVE, THE FOLLOWING MEASURES SHOULD BE APPLIED:

A. HAVE PLANTS INSPECTED FOR EARLY SYMPTOMS OF POOR HEALTH. TREES AFFECTED BY EARLY STAGES OF STRESS COULD DISPLAY PREMATURE FALL COLOR IN LATE SUMMER, PARTIAL DEFOLIATION AND SYMPTOMS OF MOISTURE STRESS.
B. PROVIDE SUPPLEMENTAL IRRIGATION EACH WEEK OR MORE OFTEN ON NEWLY PLANTED TREES, SHRUBS AND OLDER PLANTS STRESSED WITH INSECT OR DISEASE PROBLEMS WHEN RAINFALL IS LACKING IN SUMMER.
C. PRUNE FLOWERING TREES AND SHRUBS ONCE FLOWER BUDS BEGIN TO FORM IN LATE SUMMER, JUDICIOUS PRUNING REDUCES THE BLOOM SOMEWHAT BUT SHOULD NOT IMPACT THE DISPLAY SIGNIFICANTLY.
D. INSPECT FOR PESTS THAT COMMONLY ARRIVE DURING HOT, DRY WEATHER AND APPLY TREATMENTS AS NEEDED.
E. ASSESS CANOPIES FOR DEAD BRANCHES AND STRUCTURAL WEAKNESSES THAT CAN BE PRUNED LATER IN WINTER.

PLANTS MAINTENANCE NOTES:

1. CONTRACTOR SHALL PROVIDE 2 YEARS PLANT ESTABLISHMENT PERIOD TO MAINTAIN PLANTS IN A VIGOROUS GROWING CONDITION THROUGH WATERING AND PERIODIC INSPECTIONS. DURING PLANT ESTABLISHMENT PERIOD, THE CONTRACTOR SHALL ENSURE PLANTING AREAS ARE FREE OF INVASIVE WEEDS AND PLANTS SHALL BE FREE OF INSECTS AND DISEASES WHILE SHOWING SIGNS OF CONTINUING HEALTH. THE CONTRACTOR SHALL REPLACE ALL PLANTS THAT SHOW UNHEALTHY SIGNS OR ARE DEAD.

3. THE MAINTENANCE PERIOD BEGINS IMMEDIATELY AFTER THE COMPLETION OF ALL PLANTING OPERATION AND WRITTEN NOTIFICATION TO THE ENGINEER.

4. OTHER MAINTENANCE OPERATIONS DURING THE ONE-YEAR GUARANTEE PERIOD:

- RESET PLANTS TO FINISH GRADE AND RESTORATION OF PLANT SAUCERS, AS NECESSARY
- REPAIR DAMAGED OR WASHED OUT EROSION CONTROL SEEDING.
- PRUNING, INCLUDING REMOVAL OF DEAD OR BROKEN BRANCHES.
- DISEASE CONTROL.
- MAINTAINING WRAPPING, GUYS, [TURNBUCKLES,] AND STAKES. [ADJUST TURNBUCKLES TO KEEP GUY WIRES TIGHT.] REPAIR OR REPLACE ACCESSORIES WHEN REQUIRED.
- REPORT ANY PROBLEMS THAT MAY BE A HINDRANCE TO COMPLETING AND FULFILLING THE CONDITIONS OF THE PLANT GUARANTEE WITHIN 7 DAYS TO THE OWNER.

SEEDING AREA

SEED MIX:

BOTANICAL NAME	COMMON NAME	PLS LBS. PER ACRE
ELYMUS GLAUCUS	BLUE WILDRYE	21.74
FESTUCA RUBRA RUBRA	NATIVE WILD FESCUE	6.52
HORDEUM BRACHYANTHERUM	MEADOW BARLEY	4.35
GLYCERIA OCCIDENTALLIS	WESTERN MANNAGRASS	4.35
BECKMANI SYZIGACHNE	AMERICAN SLOUGHGRASS	4.35
DESCHAMPSIA CAESPITOSA	TUFTED HAIRGRASS	2.17
	TOTAL	43.38

60% SUBMITTAL

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CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

PLANTING DETAILS

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
L-2
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CODE SUMMARY

Section I - Governing Codes
2018 IBC & CHAPTER 51-50 WAC, 2018 UPC & CHAPTER 51-50 WAC, THURSTON COUNTY AMENDMENTS
2018 IECC COMMERCIAL PROVISIONS & CHAPTER 51-11C WAC

Section II - Building "Construction" Data	
Type of Construction	Type VB - CMU, Wood Rafters
Maximum Building Height	19'5" ft (to roof ridge)
Maximum Allowable Height	35 ft, LMC 16.12
Number of Stories	1 story
Allowable Stories	2 Stories
Basement	No
Total Floor Area Provided (Gross)	384 sf
Minimum Required Property Setbacks	
Front Yard	16 ft, LMC 16.12.050
Side Yard	5 ft, LMC 16.12.050
Rear Yard	20 ft, LMC 16.12.050

Section III - Building "Occupancy" Data	
Building Occupancy Classification Group	F-2 Control Room
Separated or Unseparated Use Areas	Separated
Accessory or Incidental Use Areas	N/A
Total Occupant Load by Floor	Not Customarily Occupied
Total Occupant Load for Each Room	Not Customarily Occupied
Total Occupant Load for Each Occupancy Group	Not Customarily Occupied

Section IV Building Area Data "Actual" and "Allowable"	
Actual Building Area	384 sf
Allowable Base Area	6,000 sf
Building Frontage	See Sheet A-3

Section V - "Fire Resistive" Building Elements	
Separation of Occupancies	No Separation Requirement

Section VI - Building "Existing"	
Maximum Floor Area Allowance per Occupant	Not Customarily Occupied
Exits Required in Each Room or Area	1
Exits Provided in Each Room or Area	1
Exits Required per Floor	2
Exits Provided per Floor	2
Exit Width Required per Exit	32 inches
Minimum Corridor Exit Width Required	30 inches
Emergency Exit Illumination	See Sheet E-X
Exit Sign Layout Plan	See Sheet E-X

Section VII - Building "Fire Detection and Suppression"	
Smoke Detection/Fire Alarm System Required	No, IBC 907.2.4
Smoke Detection/Fire Alarm System Provided	Yes
Type of System	Ionization Smoke Detector
Areas Protected	All
Sprinkler System Required	No
Standpipe System Required	No
Number of Fire Department Vehicle Accesses	2
Fire Extinguisher Locations	TBD

Section VIII - Occupancy Ventilation Requirements	
Ventilation Required	Natural ventilation area > 4% of floor area
Ventilation Provided	Natural (door) = 10% of floor area

Section IX - Energy Code Requirements		
Space		
Roof - Above deck rigid insulation	R=30	U=0.027
Doors (Steel door with polystyrene core)	R=5	U=0.37
Mass floor	R=30	F=0.54
CMU walls with integral perlite insulation	N/A	
Skylights	N/A	
Lighting Layout	See Sheet E-X	

Section X - Hazardous Materials	
Hazardous materials present	None

Section XI - Accessibility
Facility is exempt from accessibility requirements per 2018 IBC 1103.2.9
ADA bathroom provided

Section XII - Plumbing and Fixture Count Requirements	
Plumbing Fixtures Required	None - not customarily occupied
Plumbing Fixtures Provided	One toilet, One sink provided

Section XIII - Underground and Padmounted Transformers
See Sheet E-X

Section XIV - Special Inspection, Structural Observation
Required Structural Inspections are listed on Sheet S-1
Structural Observation requirements are indicated on Sheet S-1
Submittals are listed in specifications

Section XV - Room Specific Requirements
Not Applicable - Not Customarily Occupied

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CITY OF LACEY
LIFT STATION NO. 3 REPLACEMENT

GENERAL ARCHITECTURAL NOTES & CODE SUMMARY

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

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ARCHITECTURAL GENERAL NOTES:

1. ALL WORK SHALL CONFORM TO THE MOST RECENT VERSION OF THE I.B.C., THE WASHINGTON STATE BUILDING CODE, WASHINGTON STATE ENERGY CODE, AS WELL AS ALL LOCAL JURISDICTION RULES AND REGULATIONS.

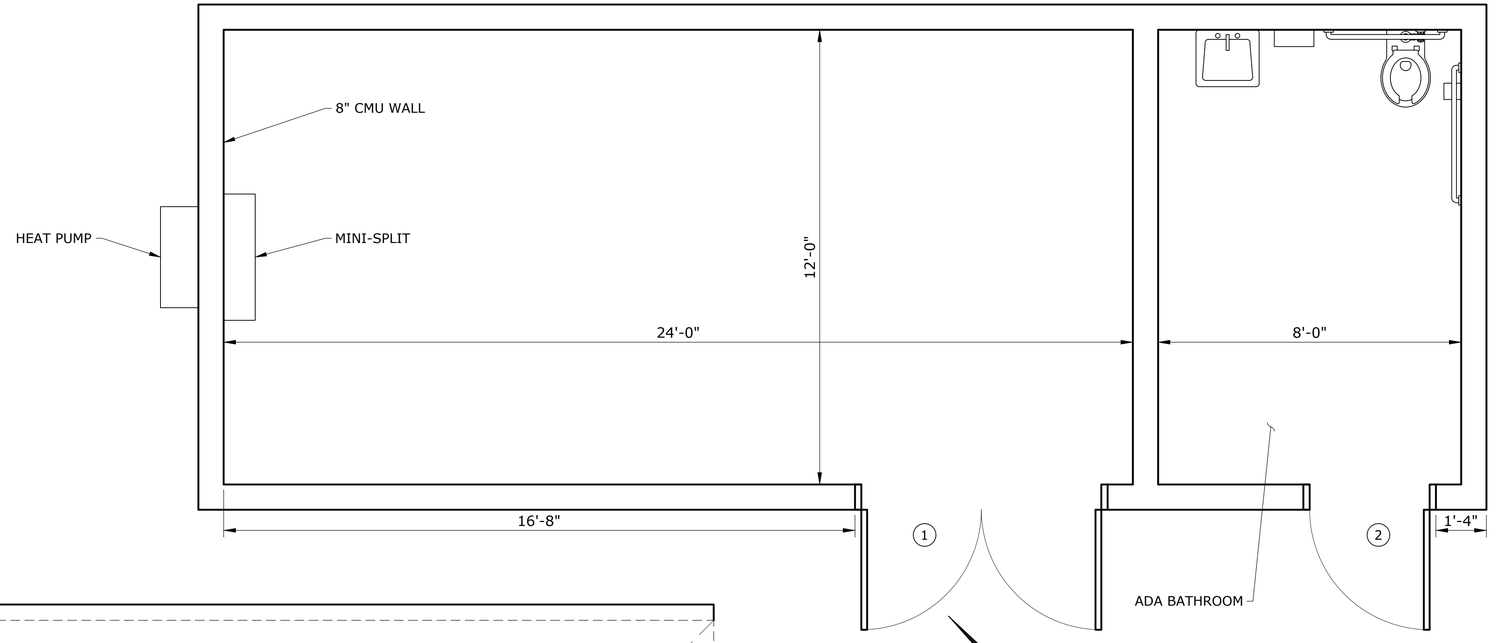
2. DIMENSIONS ARE TO FACE OF MASONRY, STUD / FRAMING UNLESS OTHERWISE INDICATED.

3. PROVIDE SEISMIC BRACING OF ALL EQUIPMENT, AS REQUIRED BY THE BUILDING CODE.

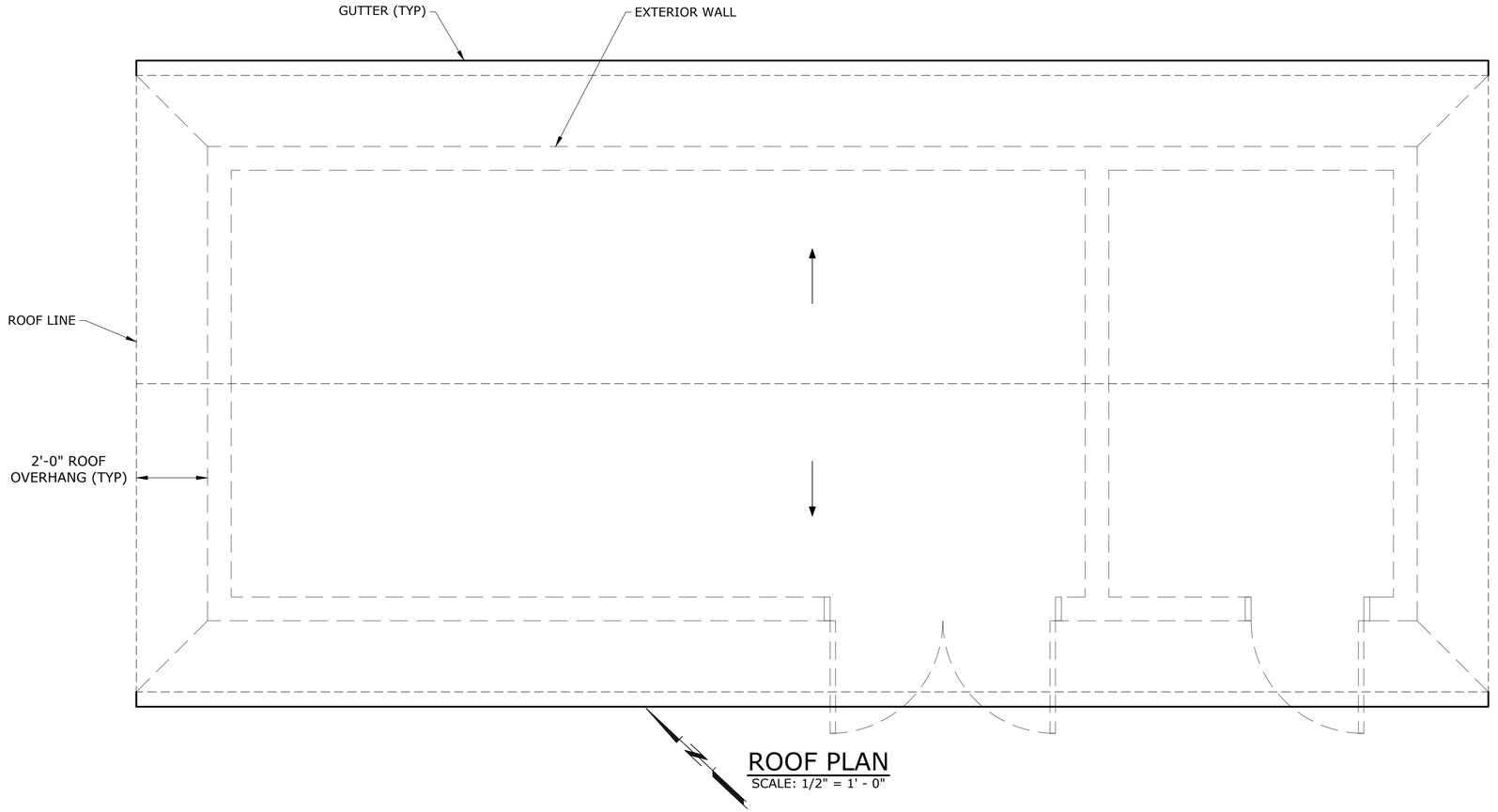
MATERIAL COLOR SCHEDULE		
ITEM/SURFACE	MATERIAL	COLOR
EXTERIOR WALLS - MAIN BLOCK	SPLIT FACE CMU	
ROOF		BROWN

DOOR SCHEDULE					
DOOR #	DESCRIPTION	ROUGH OPENING	NOMINAL SIZE	OPEN	SPECIFICATION
1	STEEL DOUBLE DOOR	6-8" x 7-4"	3'-2" x 7'-2" 3'-2" x 7'-2"	RH LHR	08 11 13
2	STEEL SINGLE DOOR	3'-4" x 7'-4"	3'-2" x 7'-2"	LHR	08 11 13

* PROVIDE OPENING ACCORDANCE TO SUPPLIER'S RECOMMENDATIONS, WHICH SUPERCEDE THIS ESTIMATE.



FLOOR PLAN
SCALE: 1/2" = 1' - 0"



ROOF PLAN
SCALE: 1/2" = 1' - 0"

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FLOOR PLAN, ROOF PLAN, & DETAILS

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

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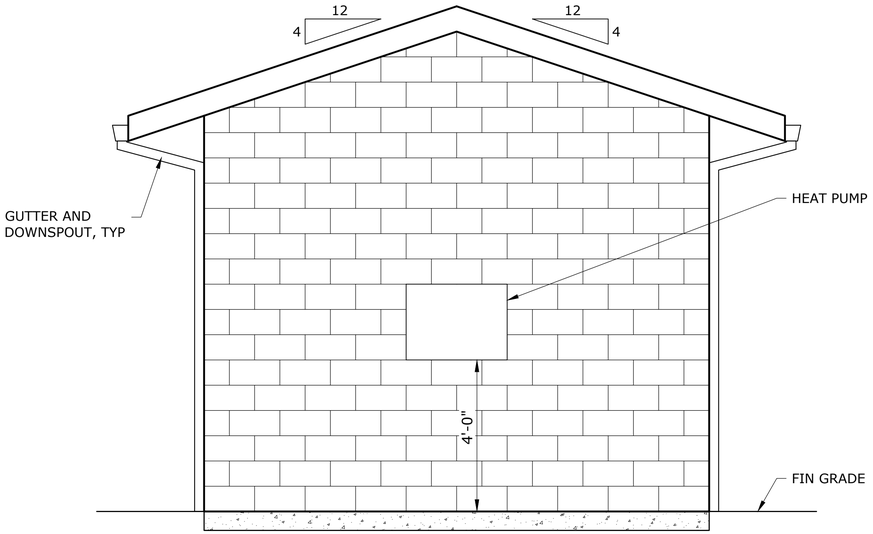
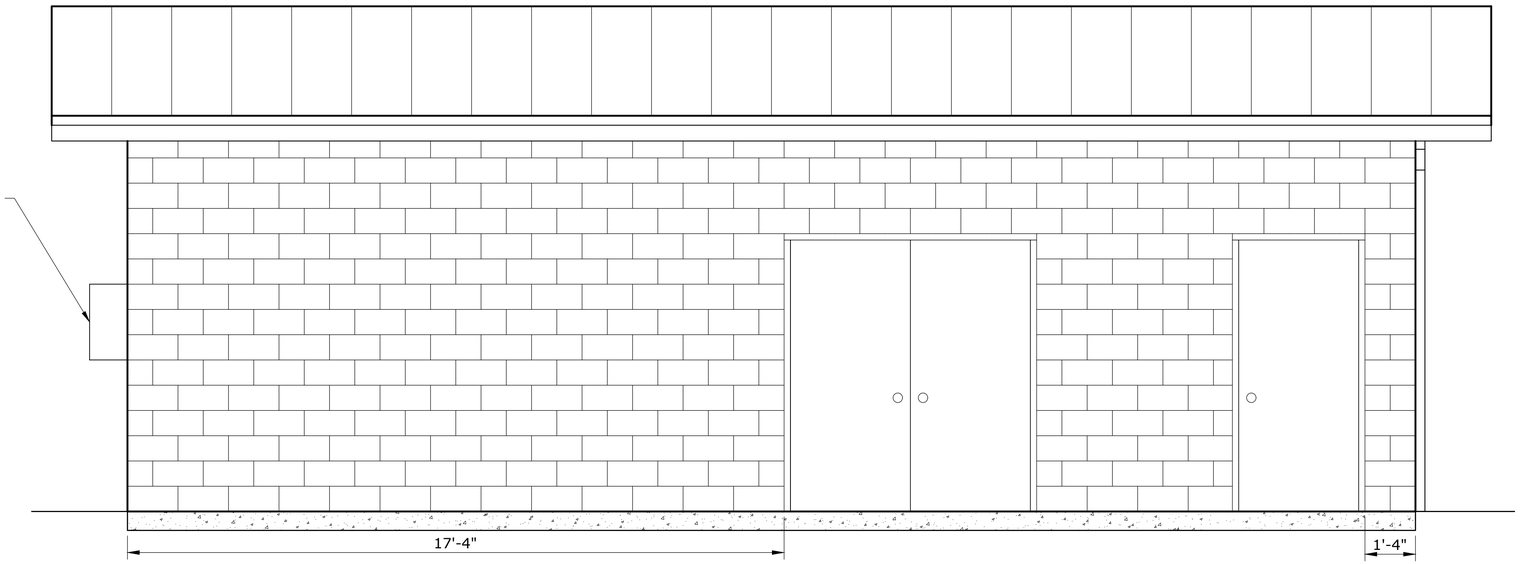
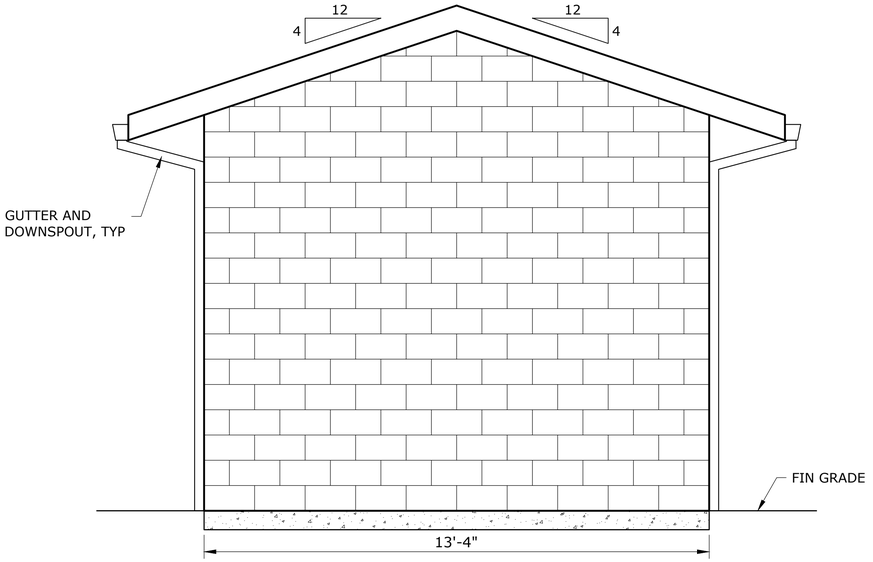


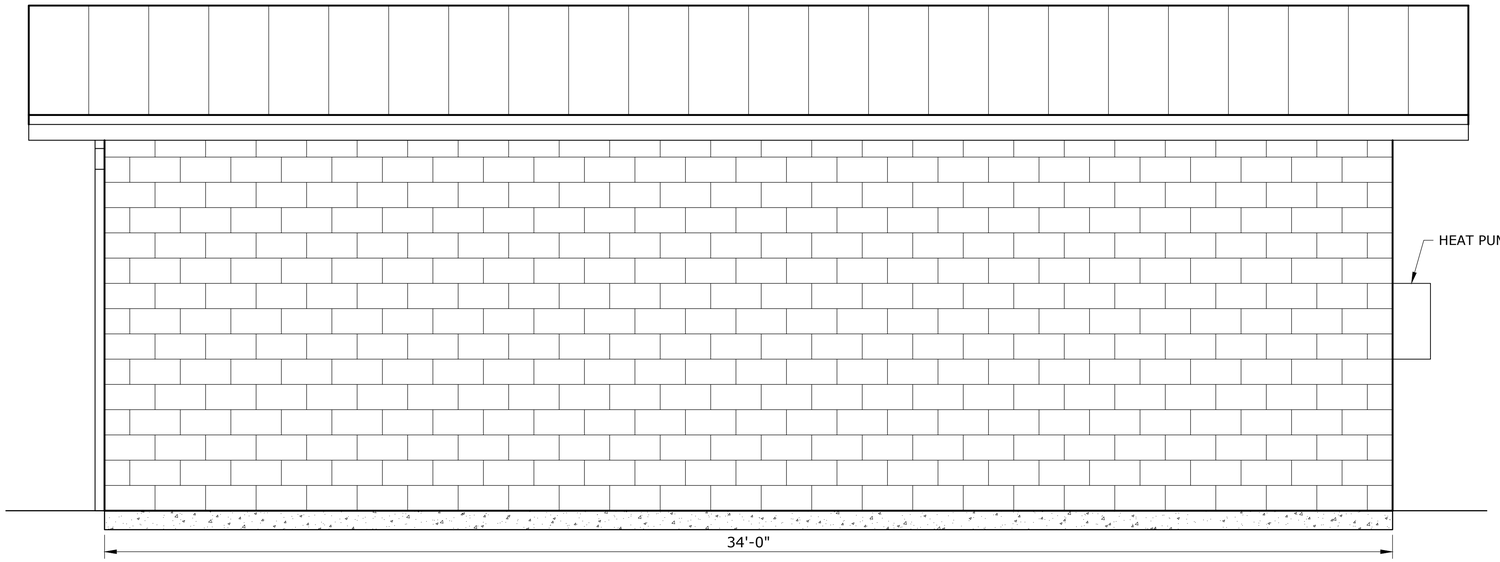
NORTH-WEST ELEVATION
SCALE: 1/2" = 1' - 0"



SOUTH-WEST ELEVATION
SCALE: 1/2" = 1' - 0"



SOUTH-EAST ELEVATION
SCALE: 1/2" = 1' - 0"



NORTH-EAST ELEVATION
SCALE: 1/2" = 1' - 0"

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BUILDING ELEVATIONS

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

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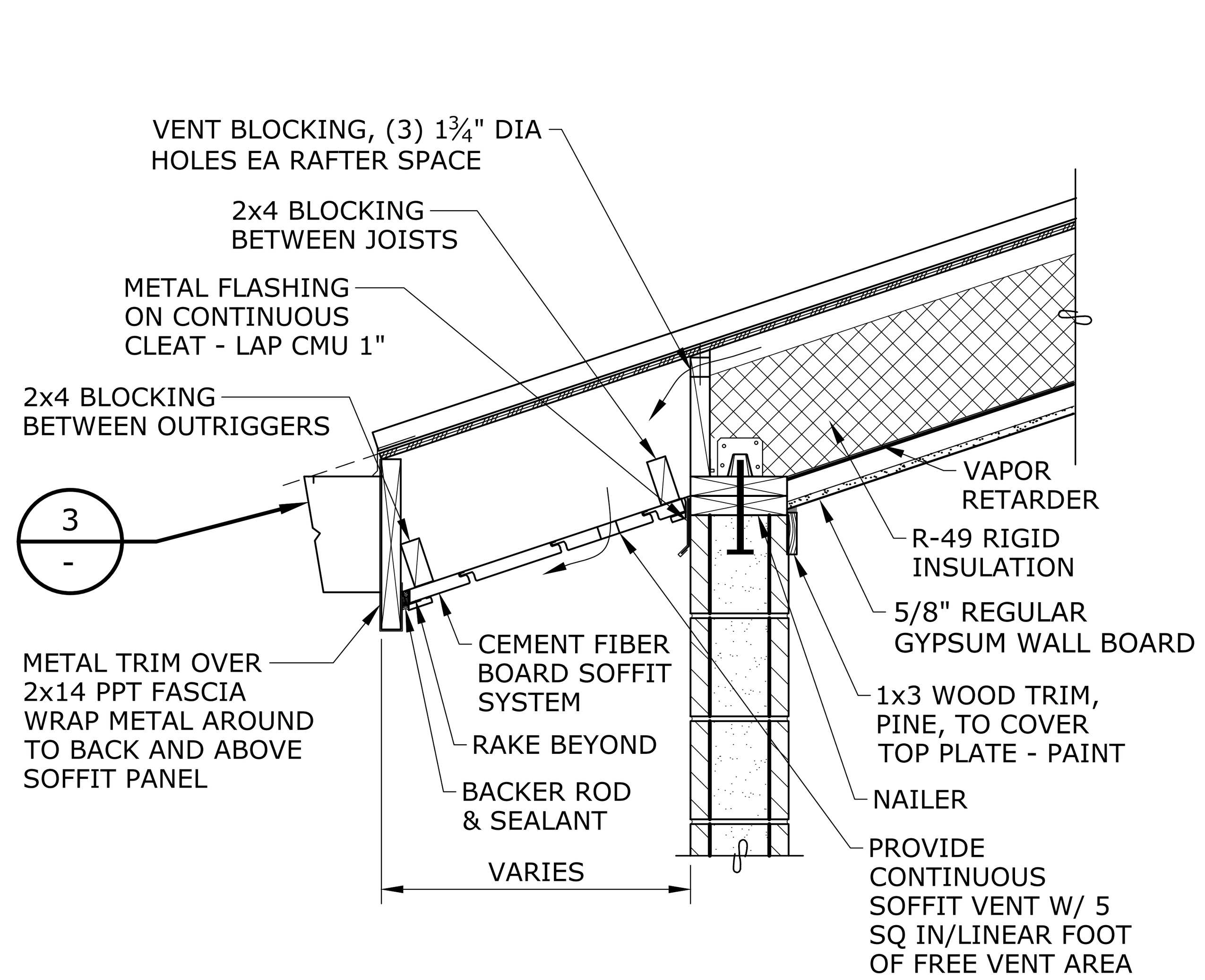
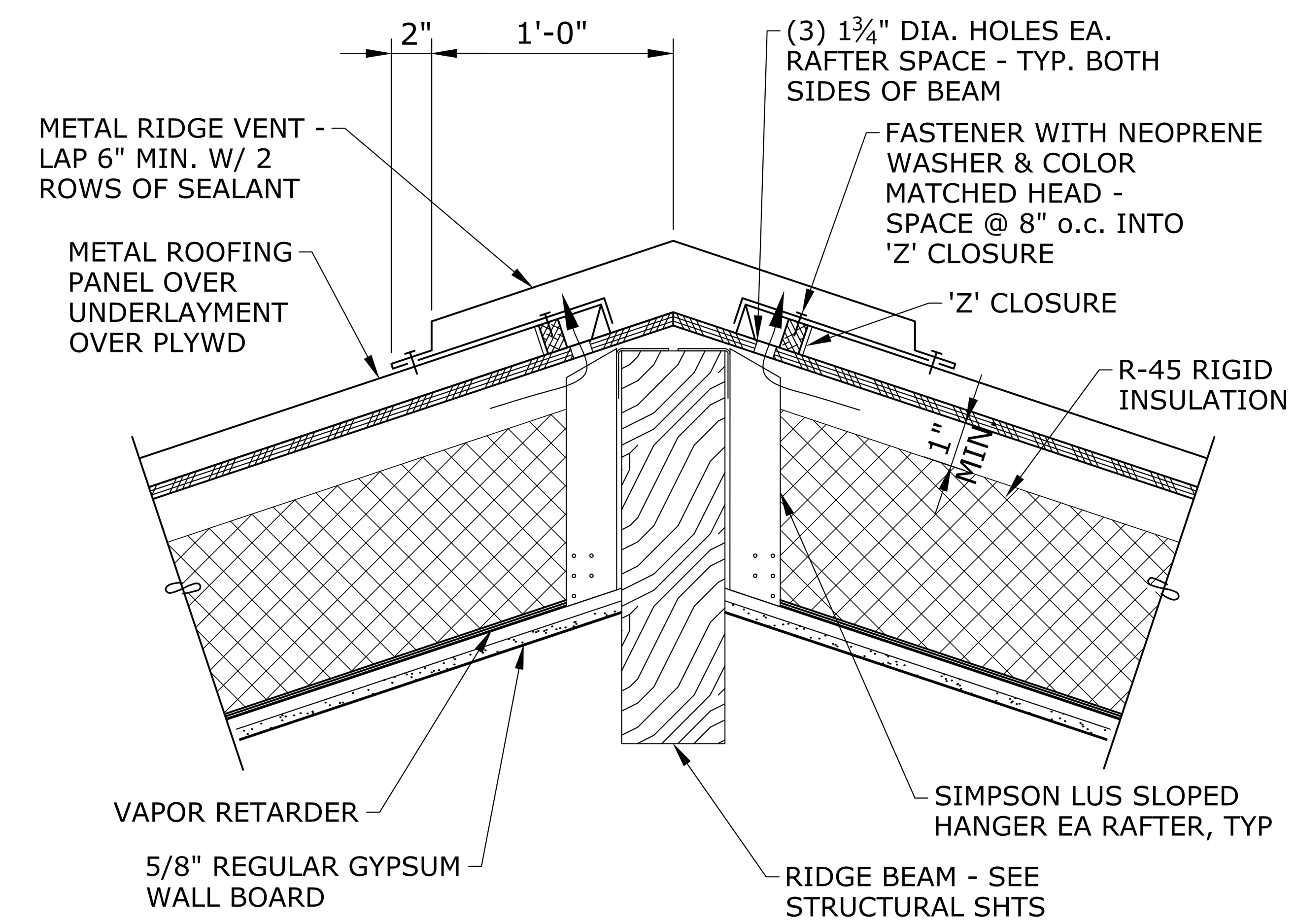
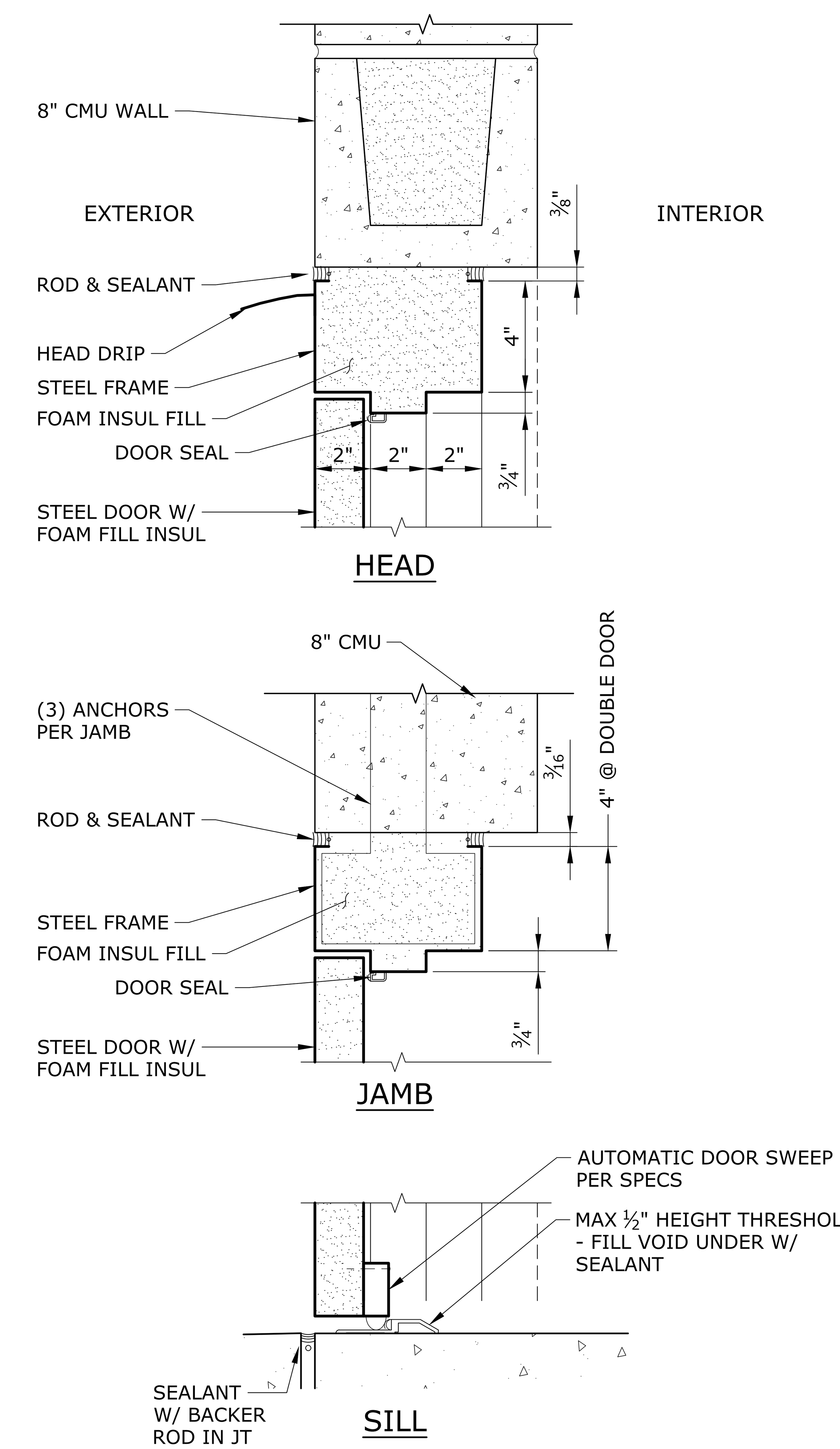


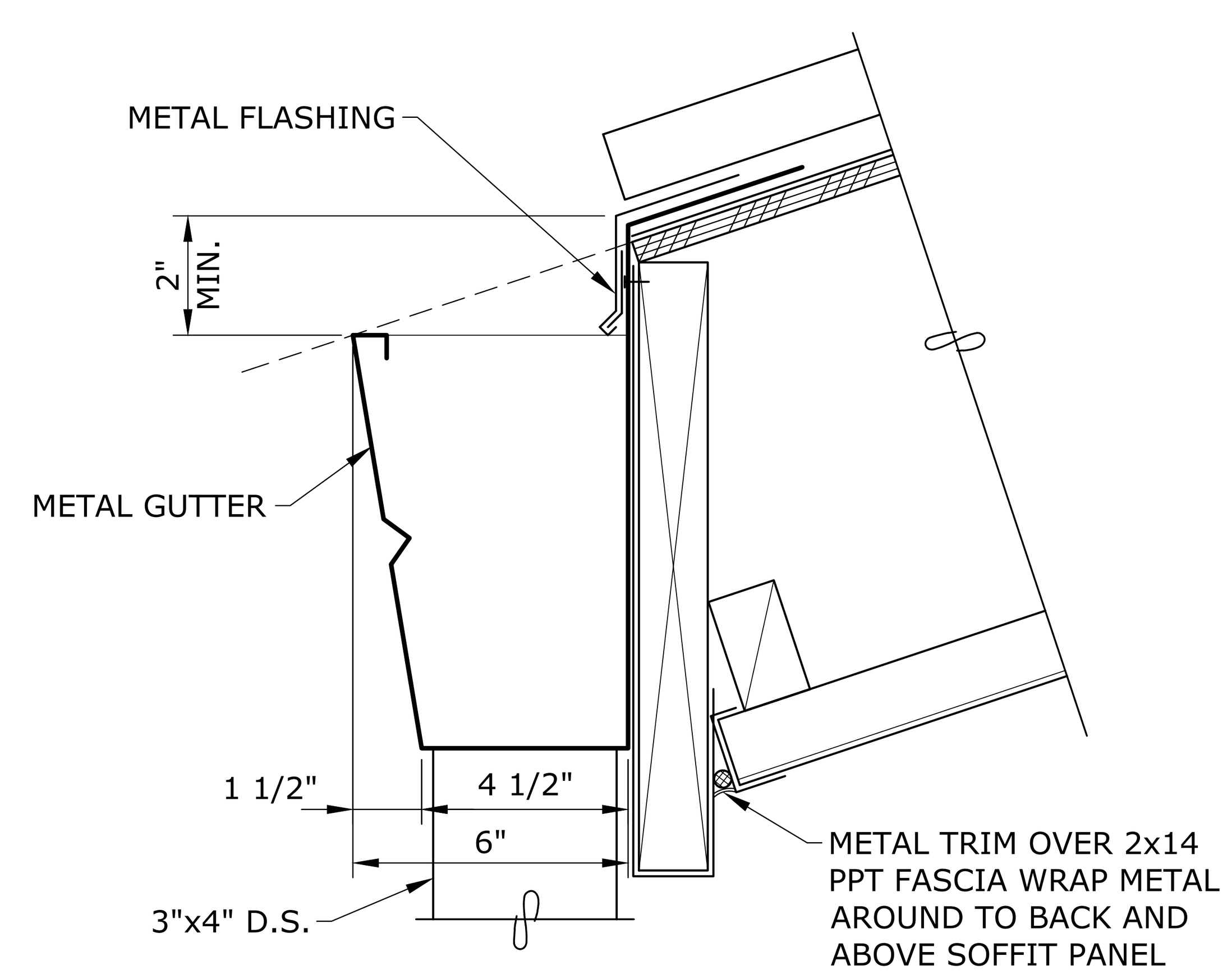
FASCIA
SCALE: 1" = 1'-0"
1
-



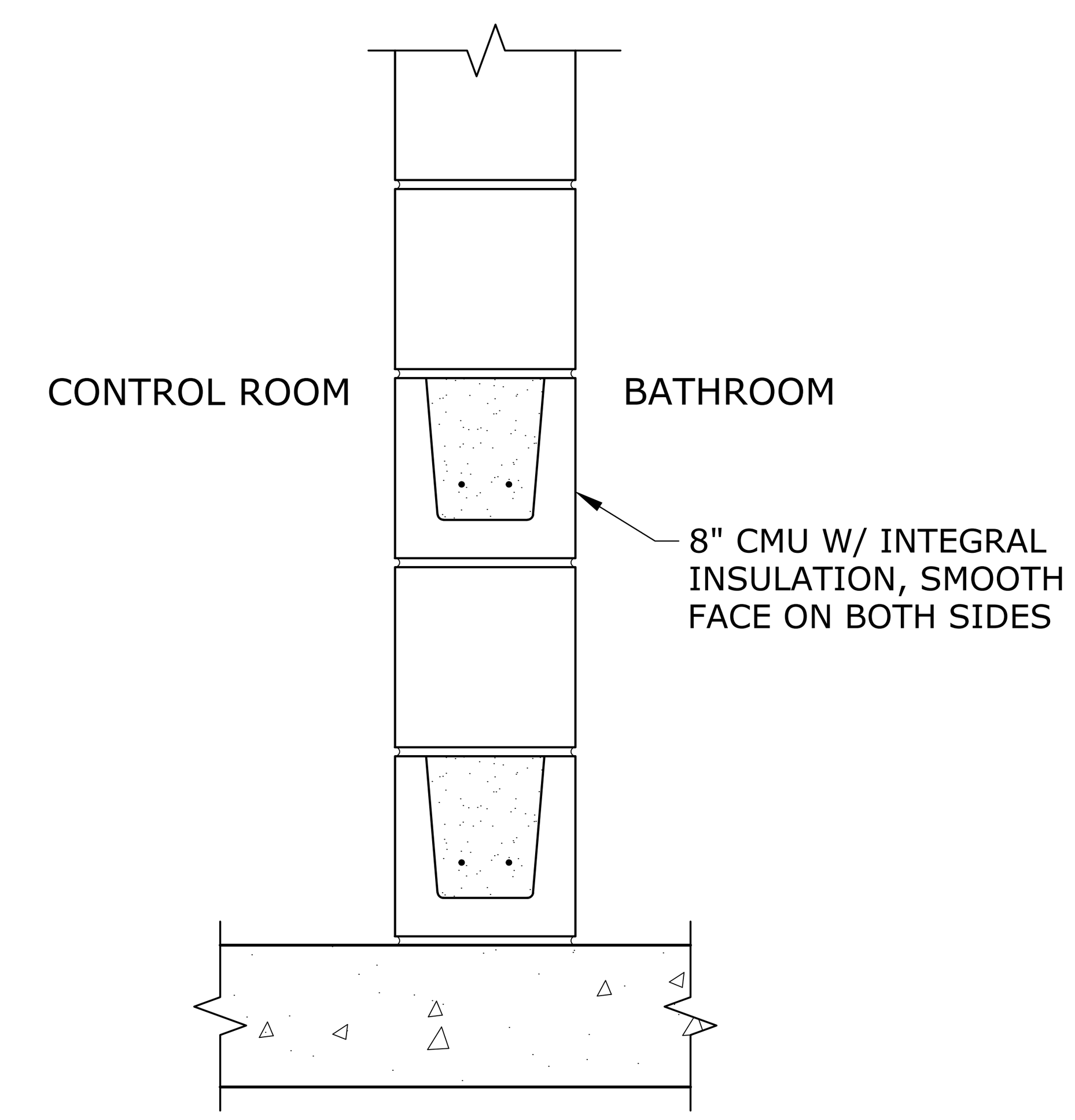
RIDGE - CONTROL ROOM
SCALE: 1 1/2"=1'-0"
2
-



EXTERIOR DOORS
SCALE: 3"=1'-0"
5
-



TYPICAL 6" GUTTER
SCALE: 3"=1'-0"
3
-



INTERIOR CMU WALL
SCALE: NTS
4
-

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ARCHITECHTURAL DETAILS

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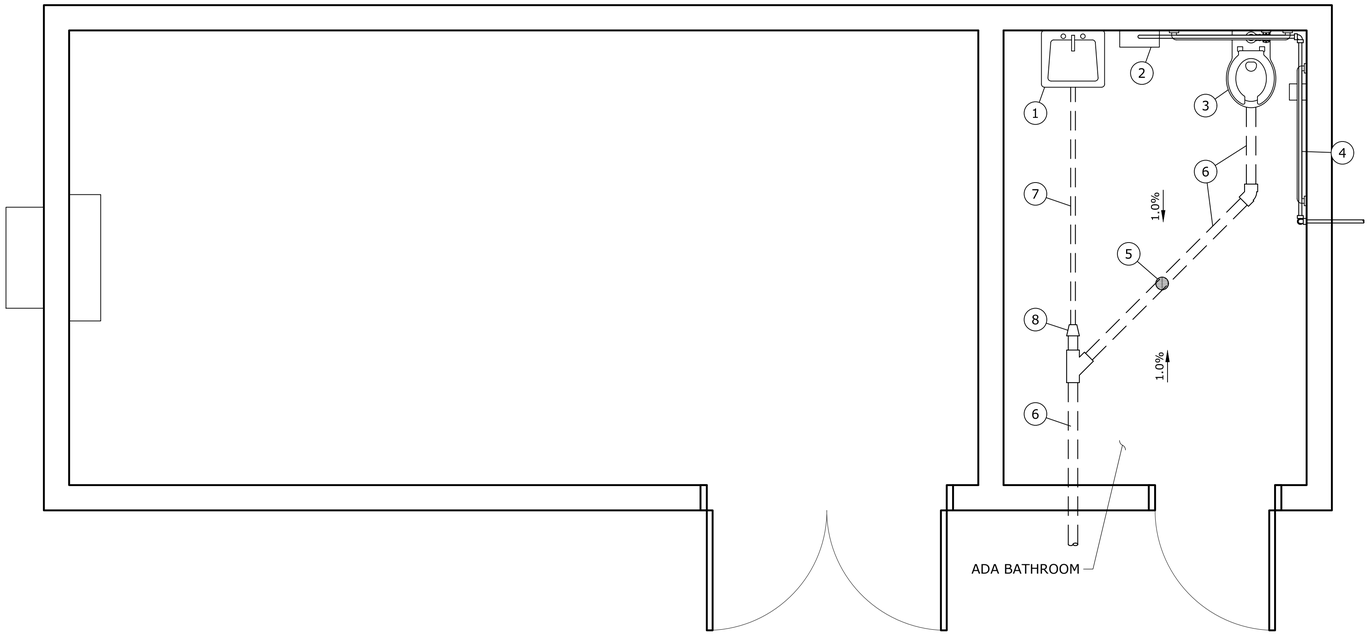


FLOOR PLAN
SCALE: 1/2" = 1' - 0"

KEY NOTES

1. STAINLESS STEEL ADA COMPLIANT WALL MOUNTED SING AND SINGLE PUSH BUTTON METERING FAUCET AND VANDAL RESTRAINT ENCLOSURE
2. TANKLESS ELECTRIC WATER HEATER, ARISTON GL 25 TI OR APPROVED EQUAL
3. STAINLESS STEEL ADA COMPLIANT WALL MOUNTED TOILET W/ CONCEALED FLUSH VALVE
4. INSTALL 1" COPPER WATER CARRIER PIPE 7' ABOVE FLOOR, SEE DET 1, THIS SHT
5. 4" DIA FLOOR DRAIN W/ P-TRAP
6. 3" DRAIN PIPE AND FITTINGS AS REQ'D
7. 1½" DRAIN PIPE
8. 1-½" x 3" RDCR

PLUMBING NOTES:

1. ALL FLOOR DRAINS, CLEANOUTS AND PLUMBING FIXTURES SHALL BE TRAPPED AND VENTED AS REQUIRED BY UNIFORM PLUMBING CODE AND LOCAL PLUMBING CODE.

2. SLOPE CONCRETE SLAB FLOORS TO FLOOR DRAINS AT 1% MINIMUM SLOPE, SEE S SHEETS.

3. SLOPE ALL DRAIN PIPING AT 2% MINIMUM.

4. ALL FLOOR DRAIN PIPING SHALL BE CAST IRON SOIL PIPE.

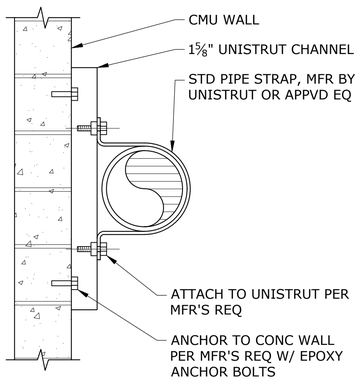
5. FOUNDATION DRAIN AND ROOF DRAINAGE NOT SHOWN. SEE CIVIL SHEETS.

6. MOUNT REDUCED PRESSURE BACKFLOW PREVENTER ASSEMBLY AND BALL VALVE TO WALL MINIMUM 36" HIGH USING UNISTRUT CHANNEL AND SUPPORTS. INSULATE DISSIMILAR METALS. SERVICE TO ALL BUILDING FACILITIES SHALL BE DOWNSTREAM OF ALL THESE APPURTENANCES.

7. ALL POTABLE WATER PIPING SHALL BE COPPER PER SPECIFICATIONS. SOLDER JOINTS.

NOTES:

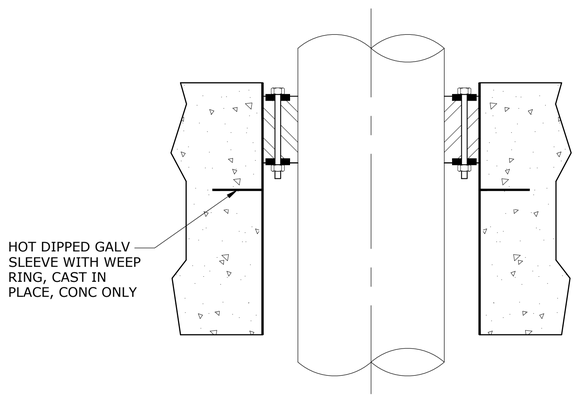
1. ALL PRESSURIZED PIPING SHALL BE MECHANICALLY RESTRAINED.



NOTES:

1. ORIENT UNISTRUT CHANNEL VERTICALLY OR HORIZONTALLY DEPENDING ON APPLICATION.
2. SUPPORT LOCATIONS PER SPECIFICATIONS.
3. ALL SUPPORT MATERIALS SHALL BE PER SPECIFICATION SECTION 22 05 29.

PIPE STRAP SUPPORT (1 / -)
SCALE: NTS



FLOOR PENETRATION DETAIL (2 / -)
SCALE: NTS

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PLUMBING PLAN AND DETAILS

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

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CONTROL DRAWING SYMBOLS

- CONTACT – NORMALLY OPEN
- CONTACT – NORMALLY CLOSED
- CONTACT –NORMALLY OPEN TIMING CLOSED
- CONTACT –NORMALLY CLOSED TIMING OPEN
- CONTACT –NORMALLY OPEN TIMING OPEN
- CONTACT –NORMALLY CLOSED TIMING CLOSED
- FLOAT SWITCH – NORMALLY OPEN
- FLOAT SWITCH – NORMALLY CLOSED
- TEMPERATURE SWITCH – NORMALLY OPEN
- TEMPERATURE SWITCH – NORMALLY CLOSED
- LIMIT SWITCH – NORMALLY OPEN
- LIMIT SWITCH – NORMALLY CLOSED
- NOHC LIMIT SWITCH – NORMALLY OPEN HELD CLOSED
- NCHO LIMIT SWITCH – NORMALLY CLOSED HELD OPEN
- PUSHBUTTON – NORMALLY OPEN
- PUSHBUTTON – NORMALLY CLOSED
- XO OX 2 POSITION SELECTOR SWITCH
- H O A 00X X00 3 POSITION SELECTOR SWITCH (HOA)
- XXO OXX 00X X00 2 POLE 3 POSITION SELECTOR SWITCH
- CIRCUIT BREAKER – SINGLE POLE
- FUSE
- CR COIL – CONTROL RELAY
- B PILOT LIGHT – PUSH–TO–TEST BLUE
- R PILOT LIGHT – PUSH–TO–TEST RED

Industrial Systems INC
12119 NE 99th Street
Suite #2090
Vancouver, Washington 98682
Phone: (360) 718-7267
Fax: (360) 952-8958
e-mail: is@industrialsystems-inc.com
OR CCB #196597 WA #INDUSSI880K9
AK #1018436
PROJECT#:21.65.01

CONTROL DRAWING SYMBOLS

- HP MOTOR, 3 PHASE
- THERMAL OVERLOAD
- MAGNETIC STARTER
- VARIABLE FREQUENCY DRIVE (VFD)
- TRANSFORMER
- HEATER
- CONNECTION
- NO CONNECTION
- FIELD WIRE
- SHIELDED WIRE
- GROUND (CHASSIS)
- GROUND (EARTH)
- FLD FIELD TERMINAL (PUMP CONTROL PANEL BACKPLATE)
- TERMINAL
- CONNECTOR

INSTRUMENTATION SYMBOLS

- LE100 LE100 – LEVEL ELEMENT (TRANSDUCER)
- LIC100 LIC100 – LEVEL INDICATE CONTROLLER (WET WELL LEVEL)
- PIT100 PIT100 – PRESSURE INDICATE TRANSMITTER (FORCE MAIN PRESSURE)
- FE100 FE100 – FLOW ELEMENT (FLOW METER ELEMENT)
- FIT100 FIT100 – FLOW INDICATE TRANSMITTER (FLOW METER TRANSMITTER)

PLAN DRAWING SYMBOLS

- J JUNCTION BOX
- M MOTOR CONNECTION
- CONDUIT SEAL–OFF
- SPECIAL EQUIPMENT CONNECTION AS NOTED
- GFI SIMPLEX, DUPLEX, QUADPLEX RECEPTACLE, W/DESIGNATOR
  GFI = GROUND FAULT INTERRUPTING
  WP = WEATHERPROOF
- $ $3 WALL SWITCH STANDARD TOGGLE, W/DESIGNATOR
  3 = 3–WAY
  O = OCCUPANCY
  T = TIMER
- SURFACE MOUNTED LED LUMINAIRE *
- WALL MOUNTED LED LUMINAIRE *

* SHADED LUMINAIRE INDICATES BATTERY BACKED UNIT

WIRING NOTES

1. 480 VOLT SUPPLY WIRING SHALL BE BROWN/ORANGE/YELLOW TINNED MTW/TEW. PHASE ROTATION SHALL BE FORWARD A. B. C.
2. ALL NEUTRAL WIRING SHALL BE WHITE TINNED MTW/TEW. ALL WIRES CONNECTED TO BREAKERS IN THE BREAKER PANEL SHALL BE BLACK 12 AWG TINNED MTW/TEW.
3. ANY 120 VAC WIRE THAT IS NOT CONNECTED DIRECTLY TO A BREAKER IS A CONTROL WIRE, ALL CONTROL WIRES SHALL BE RED 14 AWG TINNED MTW/TEW.
4. ALL 12 VDC+ WIRES SHALL BE ORANGE 16 AWG TINNED MTW/TEW. ALL 12 VDC– WIRES SHALL BE YELLOW 16 AWG TINNED MTW/TEW.
5. ALL 24 VDC+ WIRES SHALL BE DARK BLUE 16 AWG TINNED MTW/TEW. ALL 24 VDC– SHALL BE WHITE WITH A BLUE STRIPE 16 AWG TINNED MTW/TEW.
6. ALL INTRINSICALLY SAFE WIRES SHALL BE PURPLE.
7. ALL ANALOG INPUTS SHALL BE 18 AWG SHIELDED TWISTED PAIR CONDUCTORS BETWEEN SOURCE, DEVICE AND THE INPUT CARD. CONNECT THE SHIELD DRAIN ON THE PUMP CONTROL PANEL END.
8. BRANCH CIRCUITS, CONTROL CIRCUITS AND PUMP MOTOR FIELD WIRING SHALL BE THE SAME SIZE AND COLOR AS THE CONTROL PANEL WIRING IT IS CONNECTED TO. ALL FIELD WIRING SHALL BE TFFN/THHN.
9. WIRE NUTS AND BUTT SPLICES SHALL NOT BE USED IN ANY CIRCUIT OTHER THAN LIGHTING CIRCUITS.

WIRE MARKINGS

1. ALL WIRES SHALL BE LABELED WITH THE SAME DESCRIPTION ON BOTH ENDS.
2. WIRES LABEL SHALL HAVE THE SAME DESCRIPTION AS THE CITY OF LACEY'S ORIGINAL DRAWING.
3. WIRE LABELS SHALL BE PRINTED HEAT SHRINK TYPE WIRE MARKING SLEEVES.
4. WIRE LABEL TEXT SHALL BE ORIENTED IN THE SAME DIRECTION. HORIZONTAL WIRE TO READ FROM LEFT TO RIGHT AND VERTICAL WIRES TO READ FROM TOP TO BOTTOM.
5. COLOR CODE ALL SECONDARY SERVICE FEEDER AND BRANCH CIRCUIT CONDUCTORS.

TERMINAL BLOCK MARKINGS

1. TERMINAL BLOCK MARKING AND WIRE LABELING SHALL HAVE THE SAME DESCRIPTION.
2. TERMINALS BLOCKS LABELING SHALL BE MACHINE PRINTED.
3. TERMINAL BLOCK TEXT SHALL BE ORIENTED IN THE SAME DIRECTION AS THE WIRE. BLOCKS TO READ FROM LEFT TO RIGHT AND FROM TOP TO BOTTOM.

CONDUIT MARKINGS

1. CONDUITS WITH INTRINSICALLY SAFE CONDUCTORS SHALL BE LABELED.

CONTROL SYSTEMS MANUFACTURE'S NOTE

1. SUBMITTAL DRAWINGS SHALL BE SUBMITTED IN AN UNPROTECTED AUTOCAD FORMAT.
2. SUBMITTAL DRAWINGS SHALL CONTAIN EVERY DETAIL CONTAINED IN THE CITY OF LACEY'S ORIGINAL DRAWING. EVERY COMPONENT AND SYMBOL SHALL BE REPRESENTED.
3. SUBMITTAL DRAWINGS SHALL HAVE A LAYOUT KEY WITH EVERY COMPONENT OF THE CITY OF LACEY'S ORIGINAL DRAWING IDENTIFIED.
4. SUBMITTAL DRAWINGS SHALL USE THE SAME COMPONENT NAMES AS THE LAYOUT KEY IN CITY OF LACEY'S ORIGINAL DRAWING.
5. CONTROL SYSTEMS MANUFACTURE SHALL COMPLETE THE APPROVED MATERIAL CHECK LIST.

DRAWING LIST

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WIRING SYMBOLS AND REQUIREMENTS

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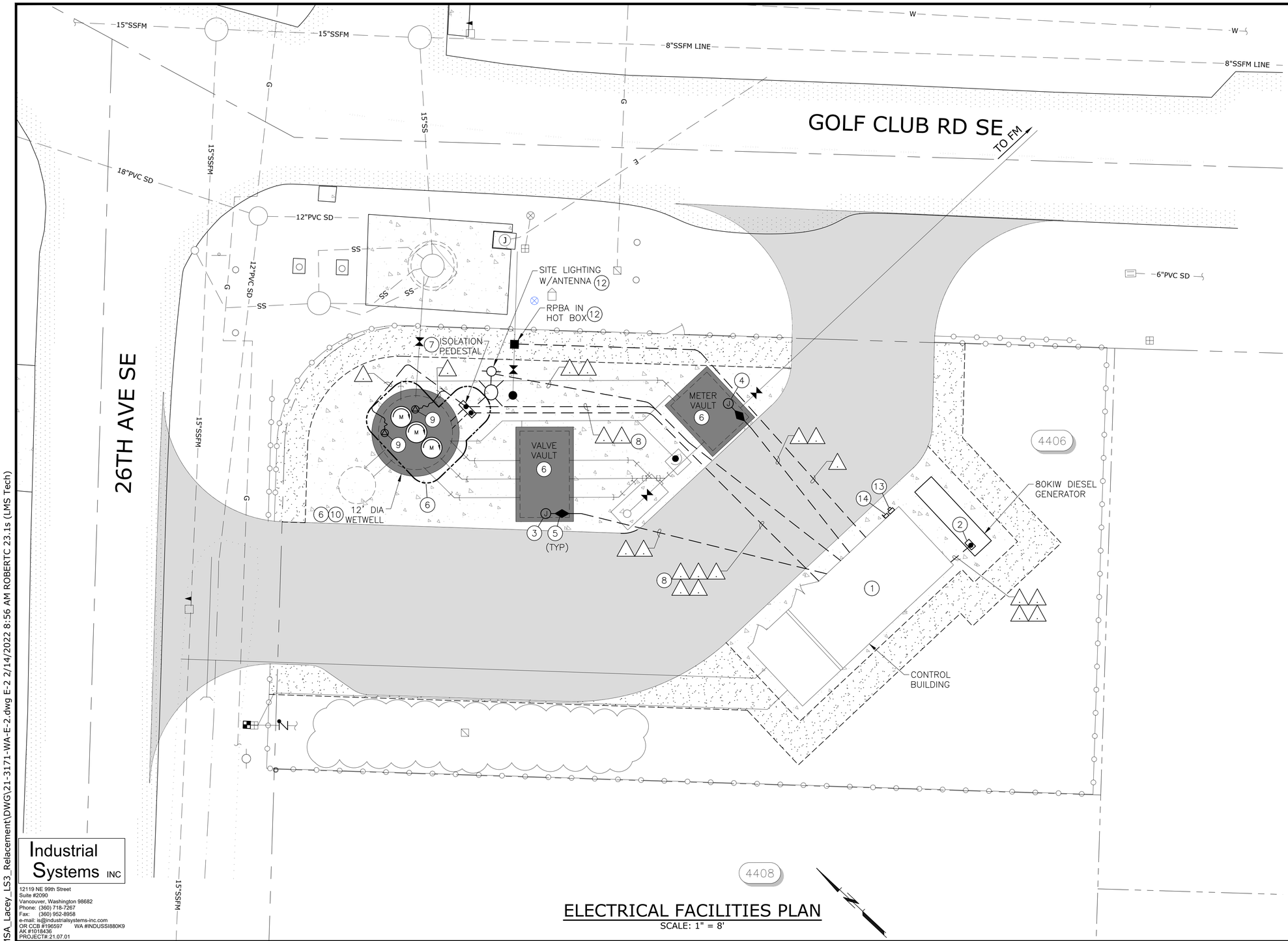
SHEET
E-1
X OF X



KEY NOTES

1. ELECTRICAL BUILDING PLANS, SEE SHEET E-3.
2. COORDINATE STUB-UP LOCATION WITH GENERATOR MFR.
3. PROVIDE AND INSTALL NEMA 4X JUNCTION BOX FOR CONNECTION OF (3) CHECK VALVE LIMIT SWITCH SWITCHES. SEE SHEET E-11. ROUTE PGRC ALONG WALLS AND PIPING WITH FLEX CONDUIT TO FINAL CONNECTION.
4. PROVIDE AND INSTALL NEMA 4X JUNCTION BOX FOR CONNECTION OF FORCE MAIN PRESSURE TRANSMITTER AND FLOWMETER. SEE SHEET E-11. FLOWMETER MFR CONDUCTORS TO BE ROUTED TO TRANSMITTER IN BUILDING AND ARE **NOT TO BE SPLICED**. ROUTE PGRC ALONG WALLS AND PIPING W/ FLEX CONDUIT TO FINAL CONNECTION.
5. CONDUITS ARE ENTERING A CLASS 1 DIV 2 AREA AND ARE REQUIRED TO BE SEALED TO PREVENT GAS PASSAGE. PROVIDE SEALANT AS REQUIRED.
6. CLASS 1 DIV. 2 GROUP D SPACE IN AN ENVELOPE 18" ABOVE GRADE 3' LATERALLY FROM HATCH AND TRENCH OPENINGS FOR WETWELL AND CLASS 1 DIV. 2 GROUP D SPACE INSIDE VAULTS. INTERIOR OF WETWELL IS CLASS 1 DIV. 1 GROUP D SPACE.
7. ISOLATION PEDESTAL WITH PUMP DISCONNECT PLUG AND RECEPTACLES. SEE SHEET E-8.
8. CONDUITS ARE PASSING THROUGH A CLASS 1 DIV 2 AREA AND ARE REQUIRED TO BE CONTINUOUS FROM BELOW GRADE TO ISOLATION PEDESTAL.
9. HIGH LEVEL (HIGH BALL) FLOAT AND LEVEL TRANSDUCER. SEE SHEETS E-11 AND E-12.
10. SUBMERSIBLE PUMPS IN WETWELL. ROUTE PUMP MFR CABLING TO ISOLATION PEDESTAL IN PUMP CABLE TRAY INSET IN CONCRETE. SEE SHEET E-8 AND CIVIL SHEETS FOR ADDITIONAL INFORMATION.
11. SITE LIGHTING WITH RADIO ANTENNA, SEE SHEET E-11.
12. SEE SHEET E-11 FOR INSTALLATION DETAIL.
13. METERBASE AND METER PER PUGET SOUND ENERGY (PSE) STANDARDS. SEE SHEET E-3.
14. PSE METERING/SERVICE ENTRANCE DISCONNECT. SEE SHEET E-3.

△ CONDUIT IDENTIFIER.
SEE CONDUIT SCHEDULE SHEET E-10.

ELECTRICAL FACILITIES PLAN
SCALE: 1" = 8'

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ELECTRICAL SITE PLAN

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SHEET
E-2
X OF X

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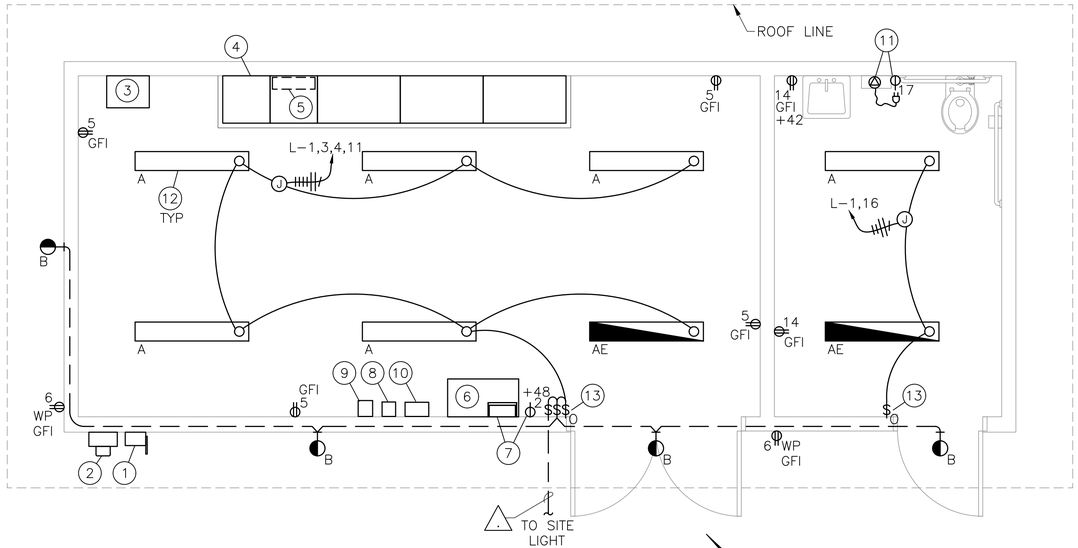
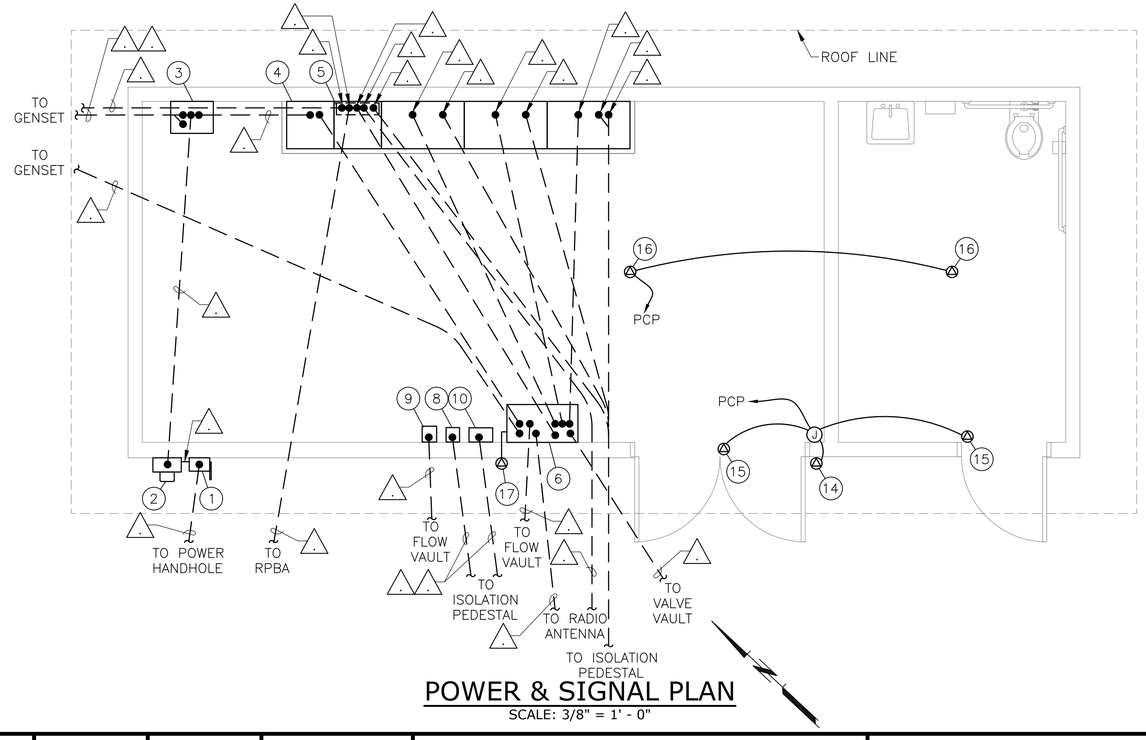
GENERAL NOTES

1. SEE SHEETS E-14, E-15 FOR APPROVED EQUIPMENT LISTING (#)
2. SEE LABEL SCHEDULE SHEET E-16. <XX>
3. ALL CONDUITS TO BE ROUTED UNDERGROUND, IN-SLAB, OR CONCEALED WHEREVER POSSIBLE OR PRACTICAL. ALL CONDUITS SHALL BE PVC COATED GALVANIZED RIGID, EXCEPT CONDUIT SOLEY INTERIOR TO THE BUILDING, IE, LIGHTING CONDUITS, WHICH CAN BE GALVANIZED RIGID.
4. ALL RECEPTACLES TO BE LOCATED 18" AFF, UNLESS OTHERWISE NOTED.
5. ROUTE UN-SWITCHED POWER CIRCUIT TO ALL BATTERY BACKED LUMINAIRES.
6. LUMINAIRES TO BE SURFACE MOUNTED AT FINAL FINISHED CEILING ELEVATION. ROUTE CONDUITS ABOVE FINISHED CEILING FOR CLEAN APPEARANCE.
7. ALL INTERIOR LIGHTING IS DIMMABLE.
8. INTERIOR LIGHTING HAS LOCAL CONTROLS TO PROVIDE MANUAL "ON-OFF" AND FULL RANGE DIMMING TRIGGERED BY OCCUPANCY SENSOR WITH AUTOMATIC TURN OFF SET AT 30 MINUTES OF OCCUPANTS LEAVING THE SPACE.
9. PROVIDE LABELING AT SWITCHES INDICATING EQUIPMENT CONTROLLED BY SWITCH, IE. "INTERIOR, AREA LIGHT, AND EXTERIOR LIGHTING". SWITCHES TO BE RECESSED IN WALL.

△ CONDUIT IDENTIFIER.
SEE CONDUIT SCHEDULE SHEET E-10.



ELECTRICAL FACILITIES PLAN
SCALE: 3/8" = 1' - 0"



POWER & SIGNAL PLAN
SCALE: 3/8" = 1' - 0"

KEY NOTES

1. MAIN SERVICE DISCONNECT, (16) INSTALL LABELS <1> <2>
2. UTILITY METER, (15), INSTALL LABEL <3>
3. AUTOMATIC TRANSFER SWITCH, (14)
4. MOTOR CONTROL CENTER (MCC). SEE SHEET E-9. INSTALL LABEL <5>
5. PANEL 'L' INTERIOR TO MCC.
6. PUMP CONTROL PANEL (PCP), SEE SHEET E-7.
7. UPS AND UPS SHELF, MOUNTED ABOVE PCP AND STRAPPED TO WALL FOR SEISMIC RESTRAINT. PROVIDE DEDICATED RECEPTACLE FOR UPS. (20) (35)
8. LEVEL TRANSMITTER, (19)
9. FLOWMETER TRANSMITTER, (23)
10. INSTRINSICALLY SAFE RELAY ENCLOSURE, SEE SHEET E-13.
11. TANKLESS WATER HEATER, PROVIDE DEDICATED RECEPTACLE FOR WATER HEATER.
12. PROVIDE AND INSTALL POWER AND DIMMING CONTROL CIRCUITING TO LUMINAIRES. HOMERUN SHOWN TO PANEL CIRCUIT ID.
13. ON/OFF/DIMMING WALL SWITCH WITH SMALL MOTION DUAL TECHNOLOGY (PDT) DETECTION. SENSOR-SWITCH WSXA PDT D WH.
14. INTRUSION BYPASS SWITCH (4)
15. INTRUSION DOOR SWITCH (5)
16. SMOKE DETECTOR (85)
17. CELLULAR ANTENNA, SEE SHEET E-13.

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ELECTRICAL BUILDING PLANS

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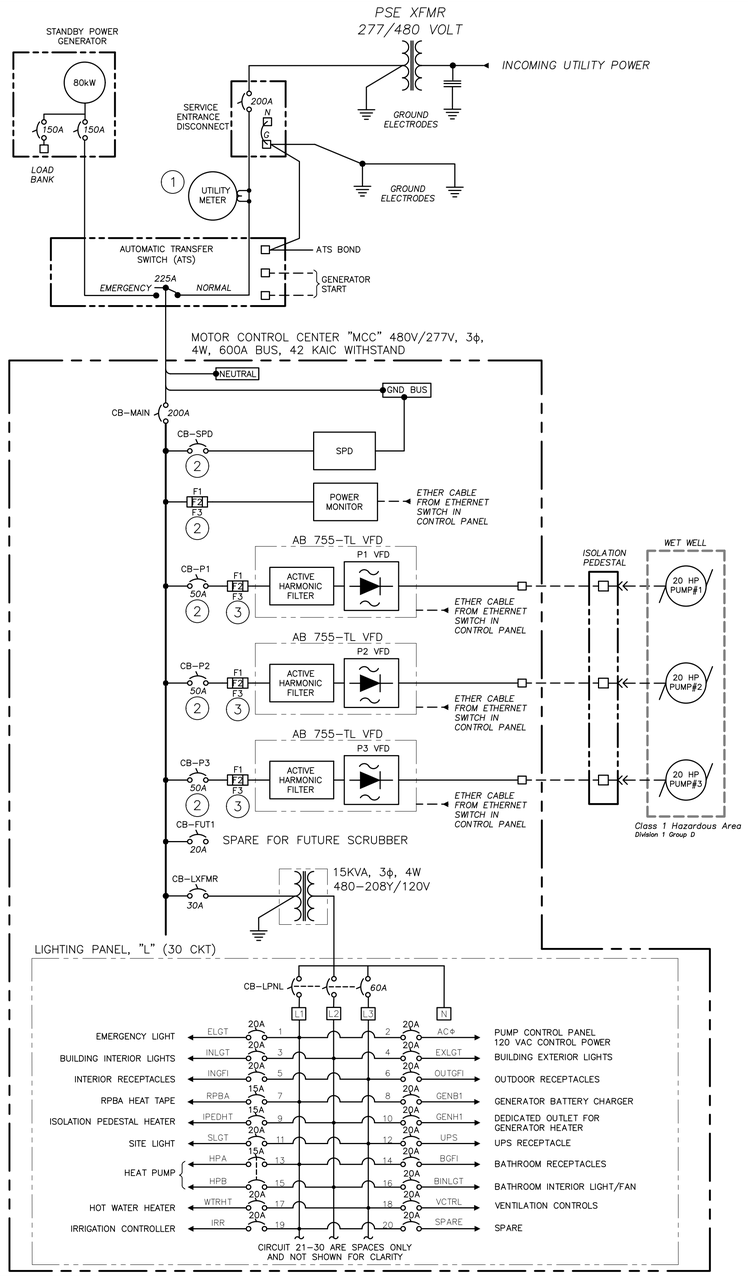
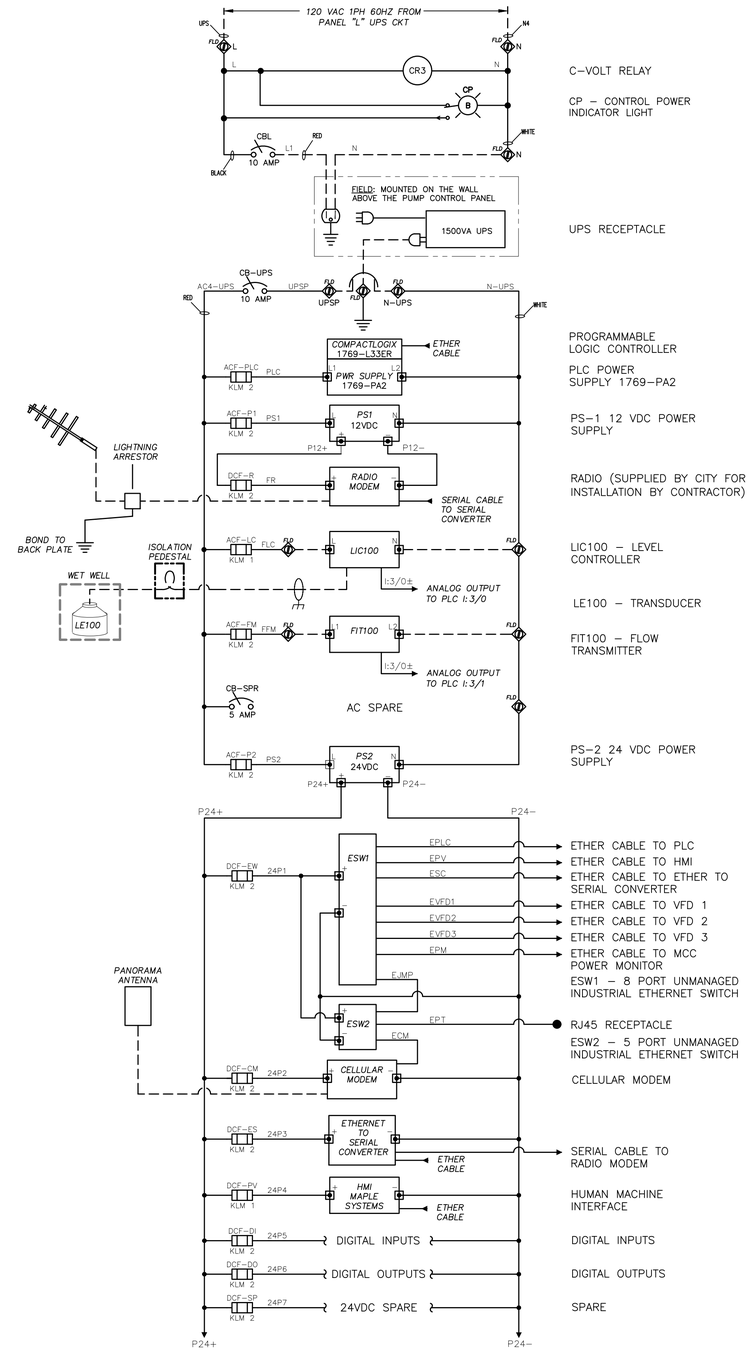
SHEET
E-3
X OF X



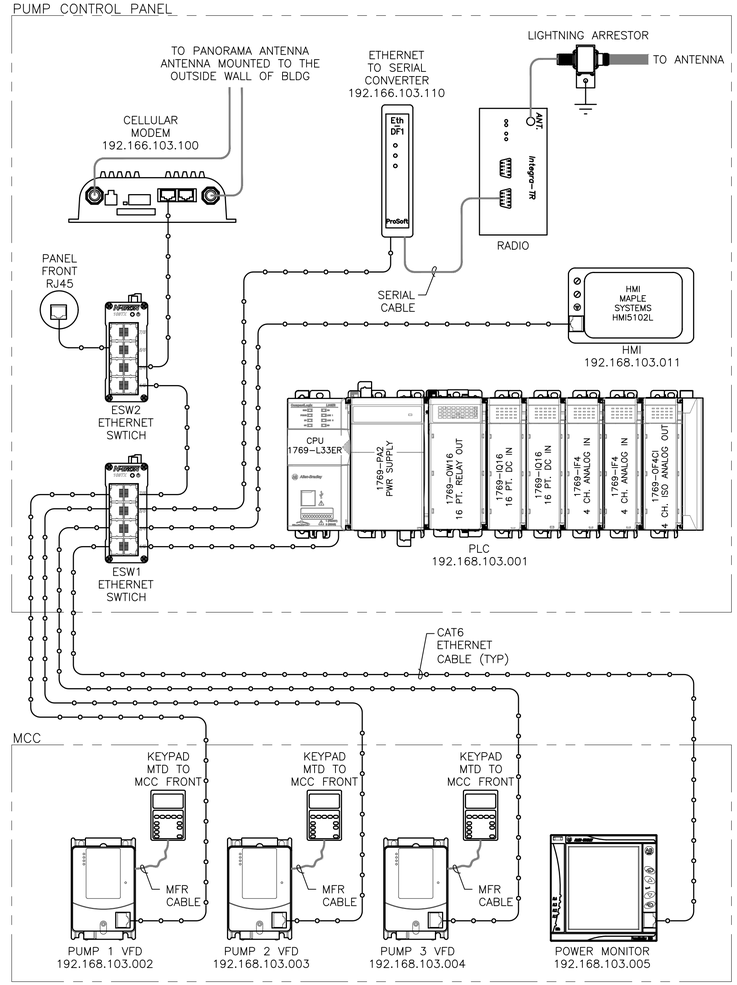
ONE-LINE DIAGRAM



PUMP CONTROL PANEL POWER DIAGRAM

KEY NOTES

1. MAIN REVENUE METERING. METER BY PUGET SOUND ENERGY (PSE); ENCLOSURE BASE PROVIDED BY CONTRACTOR PER PSE REQUIREMENTS.
2. OVERCURRENT DEVICE AND SIZE FOR EQUIPMENT TO BE PROVIDED PER MFR. RECOMMENDATIONS.
3. FAST ACTING FUSES FOR SCR PROTECTION IF RECOMMENDED BY MFR.



COMMUNICATIONS BLOCK DIAGRAM

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ONE-LINE AND PUMP CONTROL PANEL POWER DIAGRAMS

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SHEET E-4
X OF X

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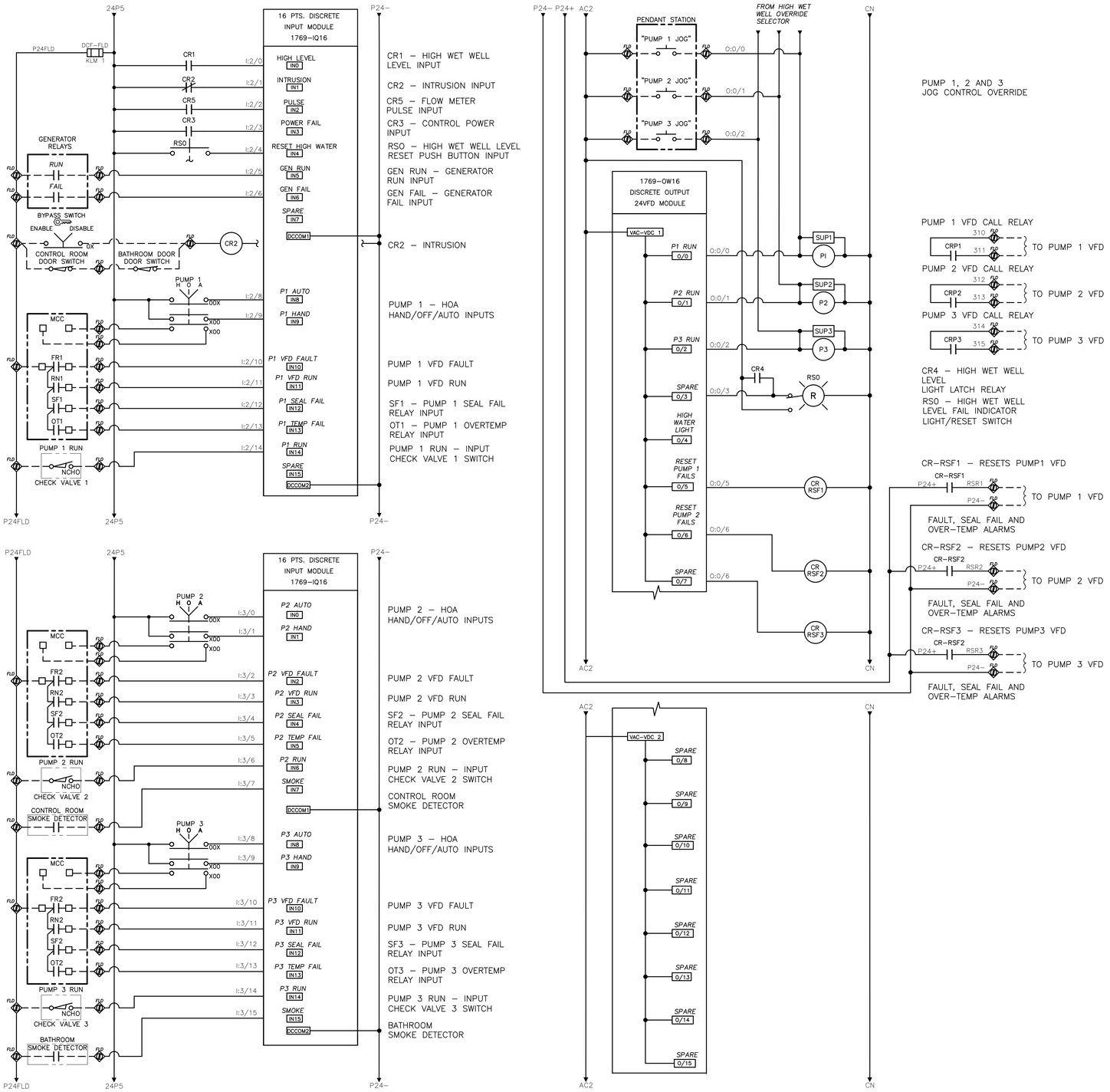

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PUMP CONTROL PANEL INPUT AND OUTPUT WIRING DIAGRAMS

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SHEET E-5 X OF X

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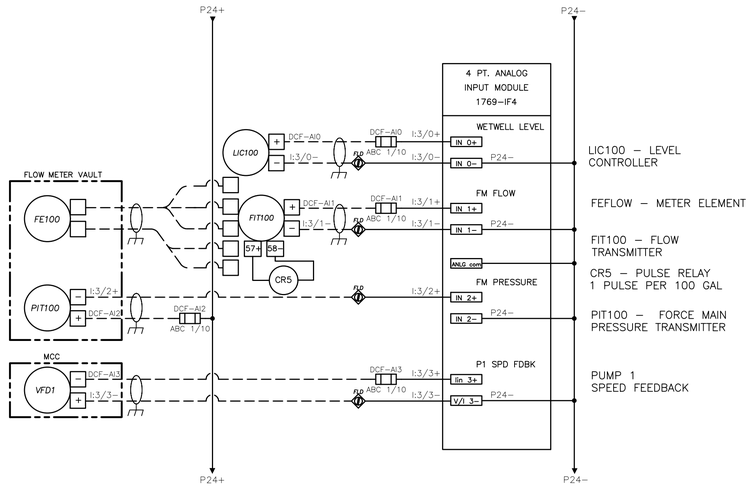

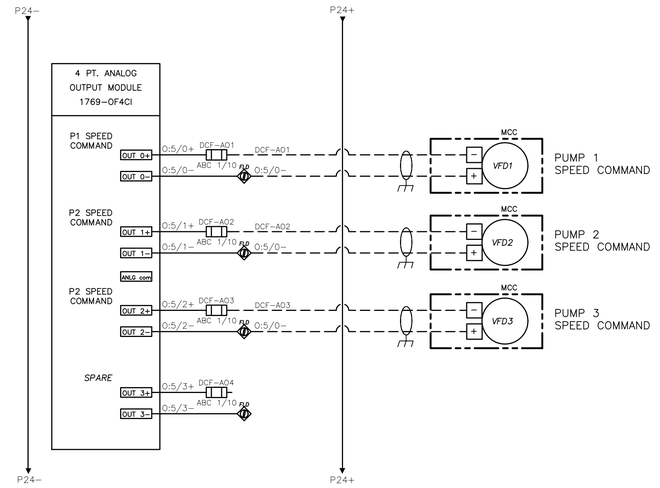

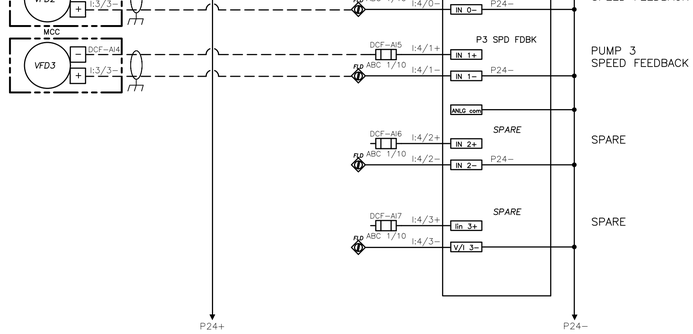

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PUMP CONTROL PANEL ANALOG WIRING DIAGRAMS

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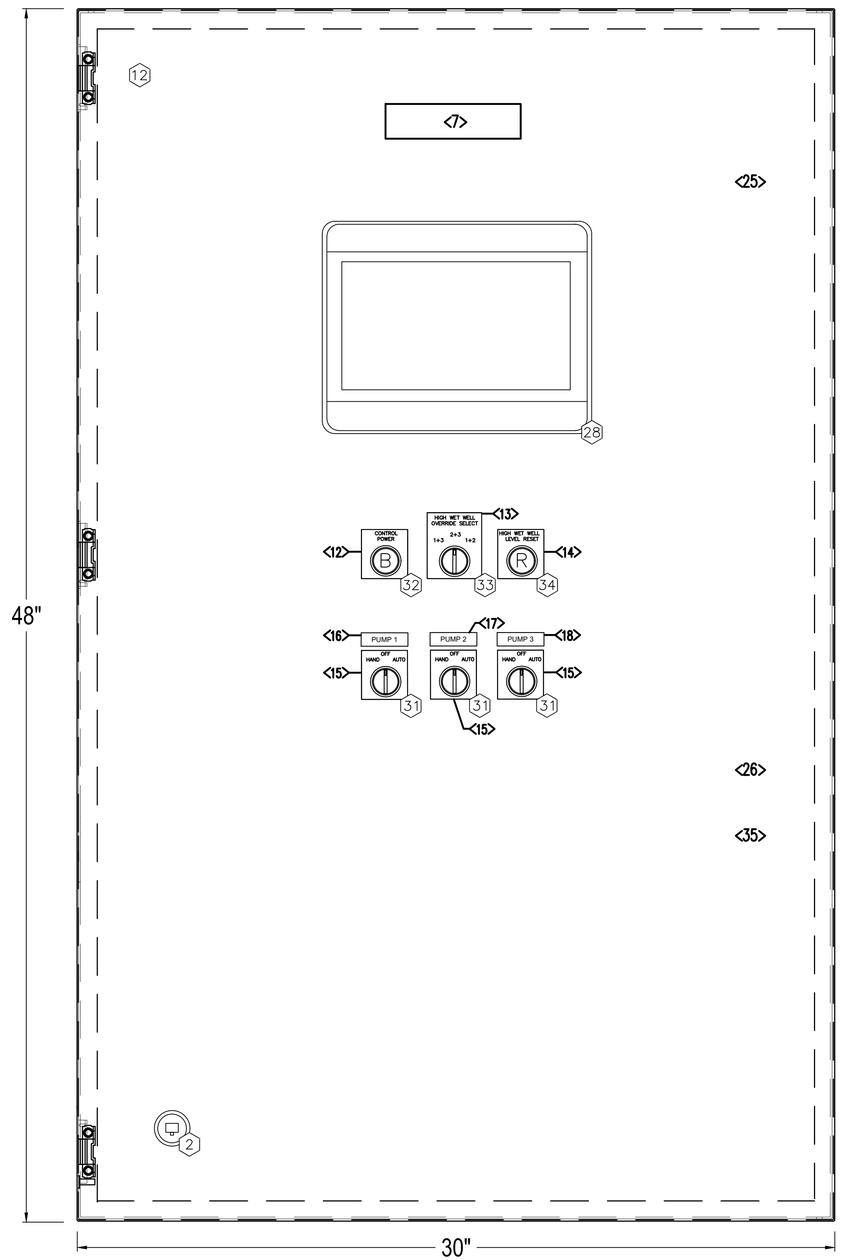
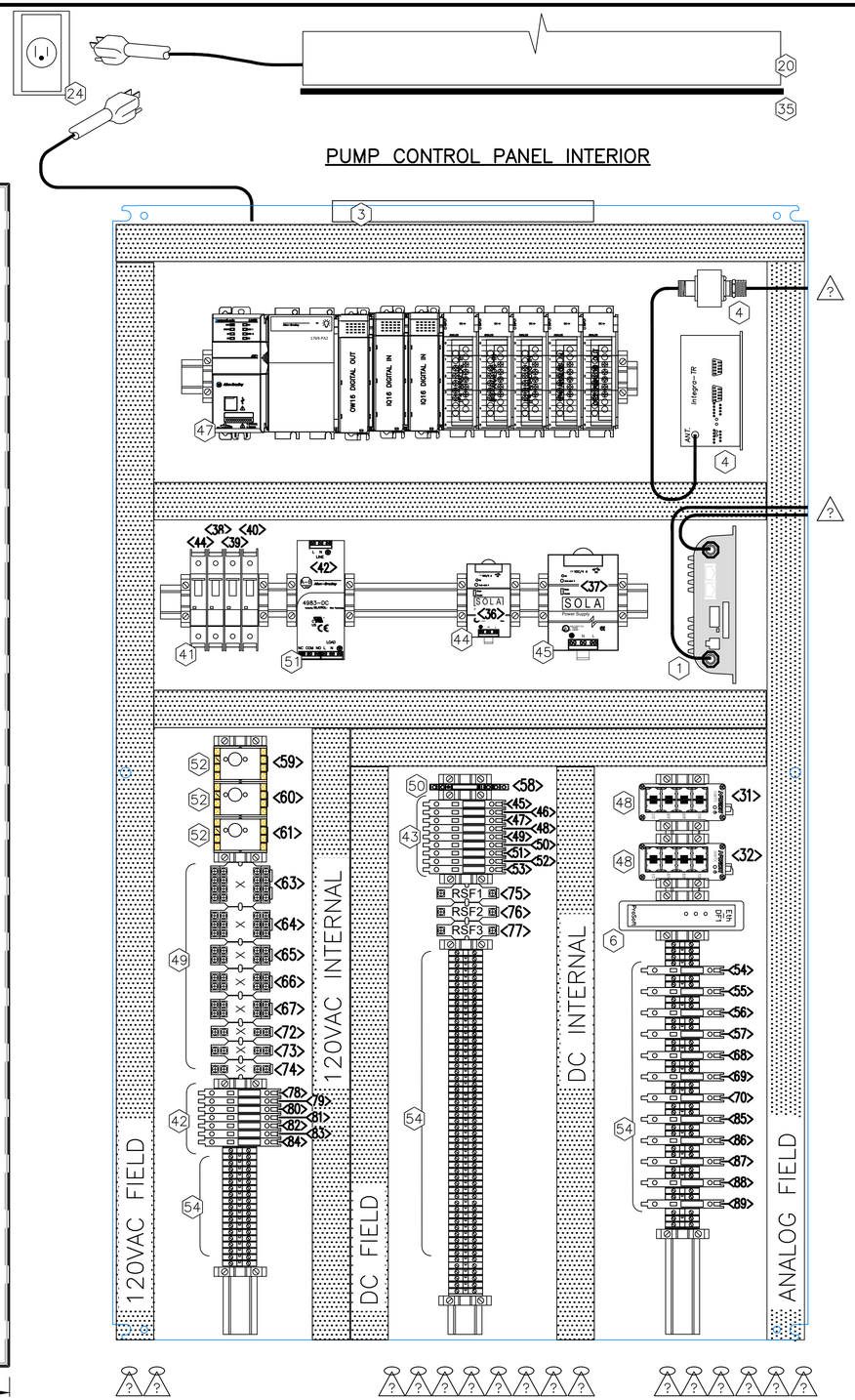
SHEET
E-6
X OF X

PUMP CONTROL PANEL EXTERIOR



PUMP CONTROL PANEL INTERIOR



SHEET LAYOUT KEY:

1. CELLULAR EQUIPMENT
2. ETHERNET PORT
3. CABINET LIGHT
4. RADIO EQUIPMENT
6. ETHERNET TO SERIAL CONVERTER
12. PUMP CONTROL PANEL
20. UPS
24. UPS RECEPTACLE
28. HMI
31. HOA SWITCH
32. CONTROL POWER INDICATOR
33. HIGH WET WELL OVERRIDE SELECTOR SWITCH
34. HIGH WET WELL LEVEL INDICATOR/RESET SWITCH
35. UPS SHELF
41. AC CIRCUIT BREAKER
42. AC FUSE HOLDERS
43. DC FUSE HOLDERS
44. 12 VDC POWER SUPPLY
45. 24 VDC POWER SUPPLY
47. PROGRAMMABLE LOGIC CONTROLLER AND I/O
48. ETHERNET SWITCH
49. CONTROL RELAYS
50. PULSE RELAY CR5
51. LINE POWER CONDITIONER
52. TIME DELAY RELAY
54. TERMINAL BLOCKS

△ CONDUIT PENETRATIONS. SEE CONDUIT SCHEDULE SHEET

<XX> SEE LABEL SCHEDULE SHEET

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PUMP CONTROL PANEL CONSTRUCTION DETAILS

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SHEET
E-7
X OF X

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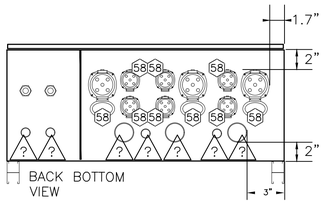
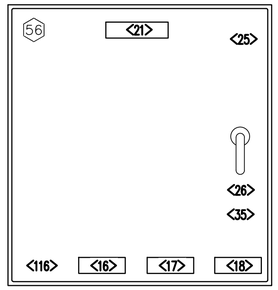
ENCLOSURE BOTTOM VIEW 'B'



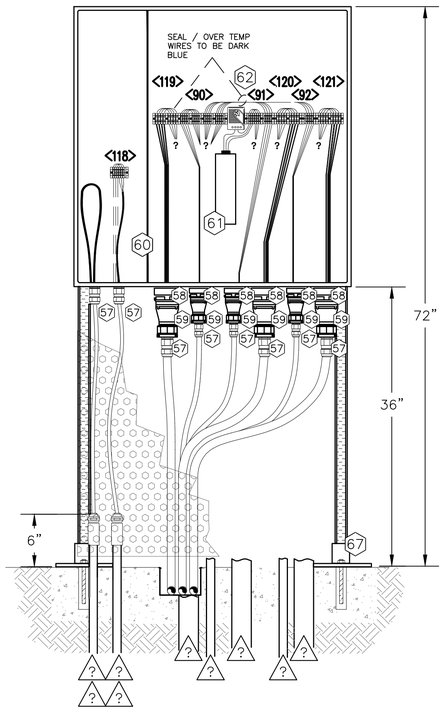
ISOLATION PEDESTAL ENCLOSURE EXTERIOR



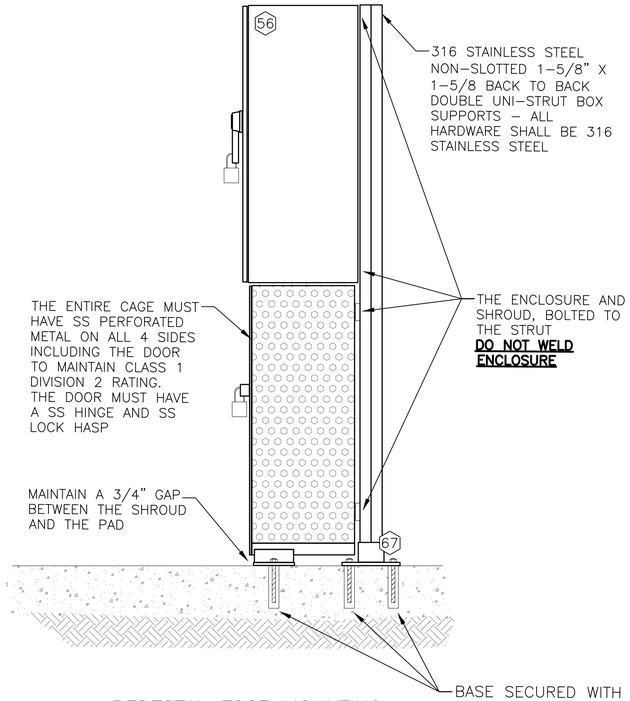
SPACE RESERVED FOR PUMP CABLE TRAY DETAIL

SHEET LAYOUT KEY:

- 56 ISOLATION PEDESTAL ENCLOSURE
- 57 CABLE SEAL
- 58 PUMP POWER RECEPTACLE
- 59 PUMP CORD CONNECTOR
- 60 ISOLATION PEDESTAL BARRIER
- 61 ISOLATION PEDESTAL HEATER
- 62 ISOLATION PEDESTAL HYGROSTAT
- 67 ISOLATION PEDESTAL POST BASE
- △ CONDUIT PENETRATIONS. SEE CONDUIT SCHEDULE SHEET
- <XX> SEE LABEL SCHEDULE SHEET

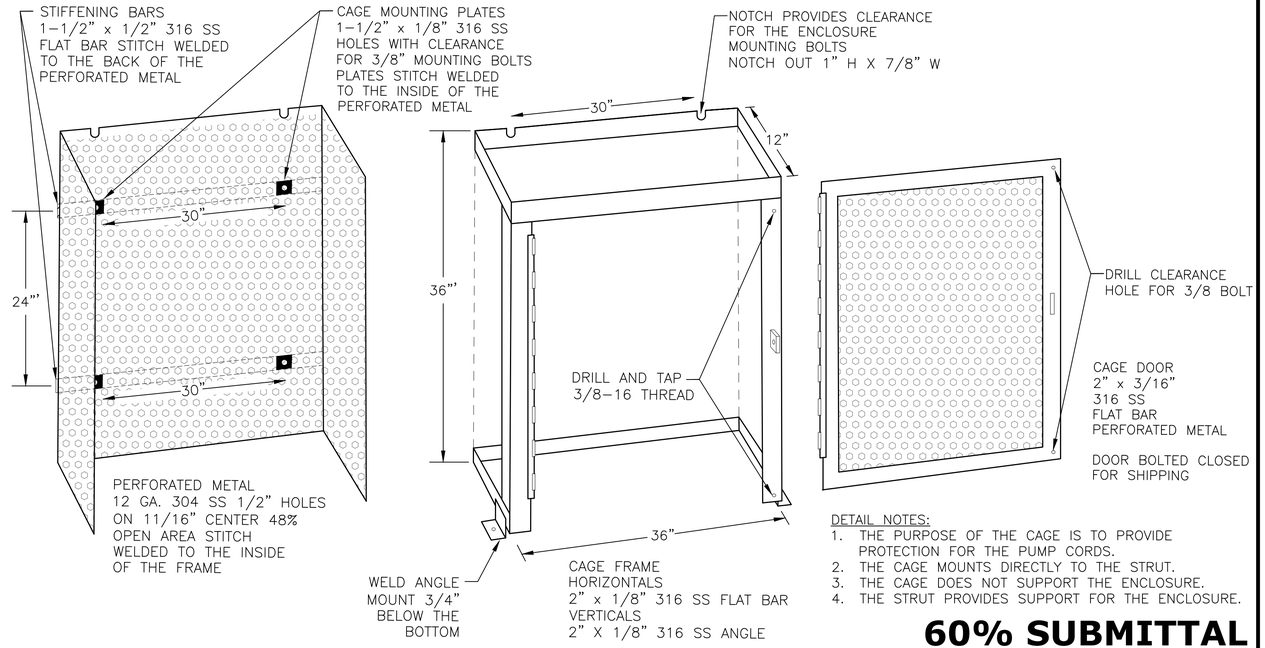


WETWELL ISOLATION PEDESTAL
ELEVATION VIEW 'A'



PEDESTAL FOOT MOUNTING
SIDE VIEW "C"

ISOLATION PEDESTAL CAGE



DETAIL NOTES:

1. THE PURPOSE OF THE CAGE IS TO PROVIDE PROTECTION FOR THE PUMP CORDS.
2. THE CAGE MOUNTS DIRECTLY TO THE STRUT.
3. THE CAGE DOES NOT SUPPORT THE ENCLOSURE.
4. THE STRUT PROVIDES SUPPORT FOR THE ENCLOSURE.

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ISOLATION PEDESTAL CONSTRUCTION DETAILS

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SHEET
E-8
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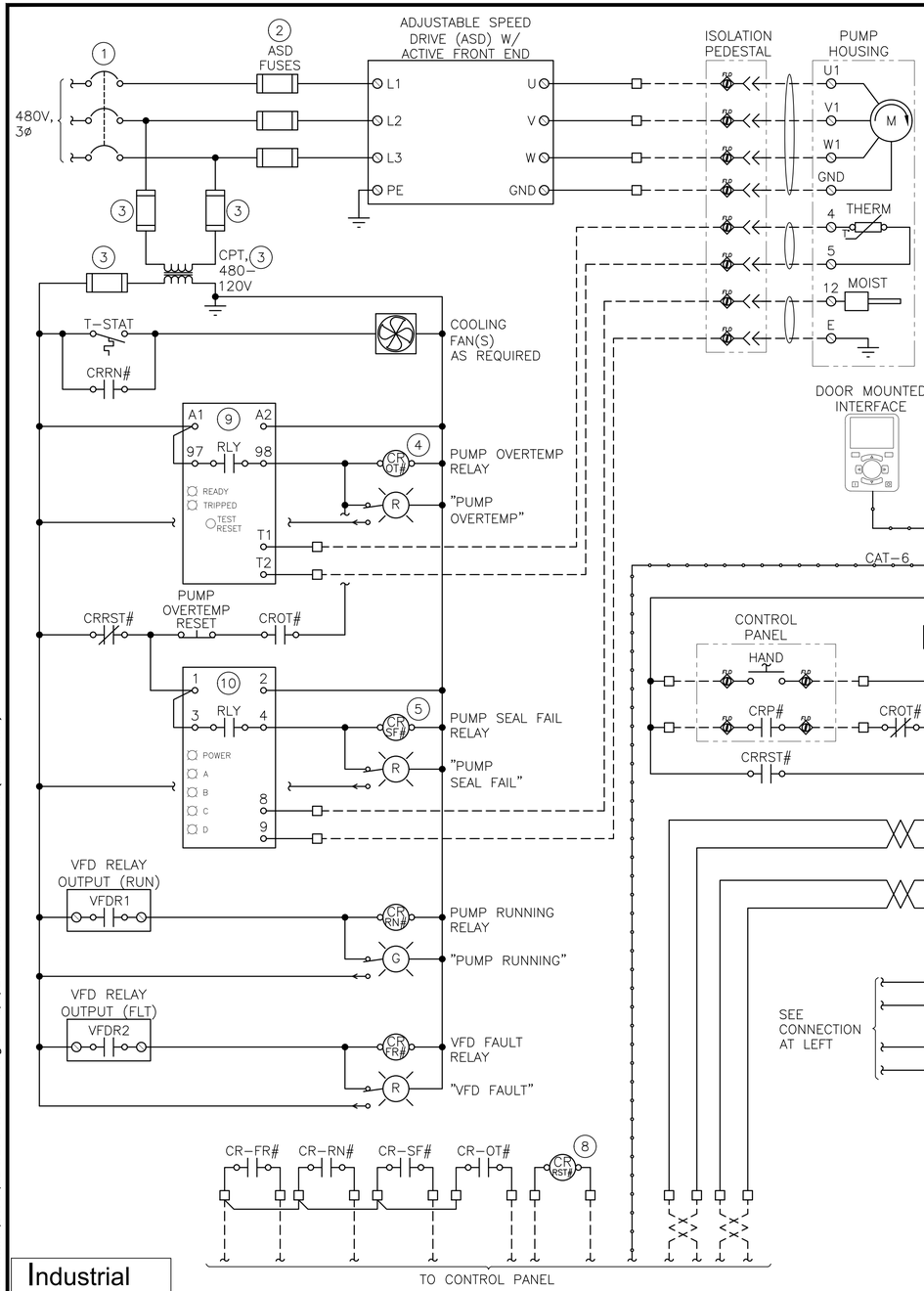
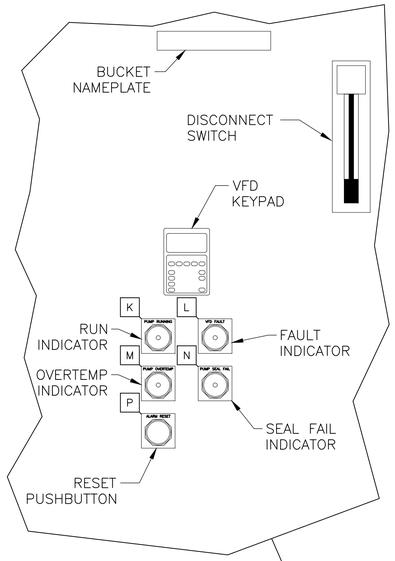


PUMP CONTROL VFD DIAGRAM (TYP)

DETAIL NOTE:
= 1 FOR PUMP 1
= 2 FOR PUMP 2
= 3 FOR PUMP 3

EXAMPLE PUMP 1:
CROT1 – PUMP OVERTEMP RELAY
CRSF1 – PUMP SEAL FAIL RELAY
CRRN1 – PUMP RUNNING RELAY
CRFR1 – PUMP VFD FAULT RELAY
CRRST1 – PUMP FAULT RESET
CRP1 – PUMP CALL RELAY @ CONTROL PANEL



DETAIL (TYP 3)

A	ITEM	MCC NAMEPLATE SCHEDULE
	A	MCC MAIN DISCONNECT
	B	POWER MONITOR
	C	SURGE PROTECTIVE DEVICE
	D	LIGHTING PANEL "L"
	E	PANEL "L" XFMR
	F	SPARE – FUTURE SCRUBBER
	G	SPACE
	H	PUMP NO. 1
	I	PUMP NO. 2
	J	PUMP NO. 3
	K	PUMP RUNNING
	L	VFD FAULT
	M	PUMP OVERTEMP
	N	PUMP SEAL FAIL
	P	PUMP OVERTEMP RESET

KEY NOTES

1. CIRCUIT BREAKER SIZING AS REQUIRED BY MANUFACTURER.
2. FUSING FOR SCR PROTECTION, IF REQUIRED BY MANUFACTURER.
3. FUSING AND CPT SIZED PER MANUFACTURER'S RECOMMENDATIONS.
4. TEMPERATURE RELAY WILL BE ENERGIZED WHEN THERE IS A TEMPERATURE ALARM.
5. SEAL FAIL RELAY WILL BE ENERGIZED WHEN THERE IS A SEAL LEAK ALARM.
6. CONFIGURE VFD INPUT TO SELECT LOCAL KEYPAD FOR START/STOP AND SPEED CONTROL.
7. VFD FAULT PROGRAM CONTACT TO BE NORMALLY CLOSED HELD OPEN AND CLOSES ON FAULT OR POWER LOSS.
8. RELAY TO BE 24VDC.
9. PUMP OVERTEMP RELAY, SIEMENS #3RN1012–1CK00 TO BE PROVIDED BY PUMP MFR. CONTRACTOR TO COORDINATE WITH MCC MFR FOR INSTALL.
10. PUMP SEAL FAIL RELAY, R–K ELECTRONICS #IS4R–120A–R–50K TO BE PROVIDED BY PUMP MFR. CONTRACTOR TO COORDINATE WITH MCC MFR FOR INSTALL.

MCC ELEVATION

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MCC LAYOUT AND VFD WIRING DIAGRAM

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
E-9
X OF X

P:\Projects\21.65.01_MSA_Lacey_LS3_Relacement\DWG\21-3171-WA-E-9.dwg E-9 2/9/2022 5:53 PM ROBERTC 23.1s (LMS Tech)

LOAD SUMMARY

	Voltage	480	3 Phase	4 Wire
QTY.	DESCRIPTION	LOAD KVA	LOAD HP	Amperes @ 480 VAC
1	PUMP 1	22.45	20.00	27.0
1	PUMP 2	22.45	20.00	27.0
1	PUMP 3	22.45	20.00	27.0
1	FUTURE AIR SCRUBBER	2.83	2.00	3.4
	NON MOTOR LOADS			
1	TRANSFORMER	15.0		18.0
1**	GENERATOR BLOCK HEATER	1.0		
1**	ISOLATION PEDESTAL HEATER	0.15		
1**	HOT WATER HEATER	1.5		
1**	HEAT PUMP	2.5		
1**	LIGHTING	0.37		
1**	RECEPTACLES	1.08		
	** - LOADS INCLUDED IN XFMR LOAD			
	SUBTOTAL		62.0	102.4
	LARGEST MOTOR X 25%	5.61		6.8
	NON-MOTOR LOADS X 25%	3.74		4.5
	SPARE CAPACITY (20%)	21.28		25.6
	TOTAL			139.3

GENERATOR LOAD CHART

LOAD REQUIREMENTS			PERFORMANCE REQUIREMENTS	
RUNNING kW	65.1		NOMINAL 480V, 60HZ, 3PH	
RUNNING kVA	75.9		MAX. VOLTAGE DIP %	20.0
RUNNING P.F.	0.9		MAX. FREQUENCY DIP %	10.0
MAX. START kW	26.8	IN STEP 1	MAX. VOLTAGE HARMONIC DISTORATION %	10.0
MAX. START kVA	34	IN STEP 1	MIN. GENERATOR LOADED %	30.0
			MAX. GENERATOR LOADED %	90.0
			TOTAL kW REQUIRED	80.0
			TOTAL AMPS REQUIRED	120.0

GENERATOR SIZING BASED ON THE FOLLOWING STEP CONFIGURATION:
STEP 1 - TRANSFORMER - FULL LOAD
FUTURE AIR SCRUBBER
STEP 2 - PUMP 1
STEP 3 - PUMP 2
STEP 4 - PUMP 3

CONSTRUCTION NOTE : CONDUIT INSTALLATION

1. ALL STRUT MOUNTING HARDWARE MUST BE STAINLESS STEEL.
2. MYERS HUB FITTING MUST BE USED ON ALL CONDUIT PENETRATIONS INTO ENCLOSURES.
3. ALL CONDUIT MUST BE PVC COATED GALVANIZED RIGID.
4. THE PROPER TOOLS MUST USED WHILE CUTTING, THREADING, BENDING AND TIGHTENING ANY PVC COATED CONDUIT.
5. THE PVC COATING MUST REMAIN INTACT; ONLY 1 INCH OF THE COATING MAY BE REMOVED AT THE END OF THE CONDUIT TO ALLOW FOR THREADING.
6. ANY CONDUIT WITH THE DAMAGED COATING MUST BE REPLACED.
7. THE COATING TOUCH–UP PAINT IS TO BE USED FOR COSMETIC BLEMISHES.
8. ALL THREADED CONNECTIONS MUST BE COPPER COATED AND TIGHTENED APPROPRIATELY.
9. ALL UNDERGROUND CONDUIT RUNS MUST BE INSPECTED BEFORE THEY CAN BE COVERED.
10. CORE AND INSTALL LINK SEAL ON ALL CONDUIT PENETRATIONS INTO BELOW GRADE STRUCTURES, I.E. VAULTS AND WET WELL.

CONDUIT AND WIRE SCHEDULE

CONDUIT USE	CONDUIT DESIGNATION	CONDUIT SIZE	CONDUIT TYPE	CONDUCTOR SIZE AND NUMBER OF CONDUCTORS	CONDUIT FROM	CONDUIT TO
	A					
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					
	N					
	O					
	P					
	Q					
	R					
	S					
	T					
	U					
	V					
	W					
	X					
	Y					
	Z					
	AA					
	BB					
	CC					
	DD					
	EE					
	FF					
	GG					
	HH					
	JJ					
	KK					
	LL					

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LOAD TABLES AND CONDUIT SCHEDULE

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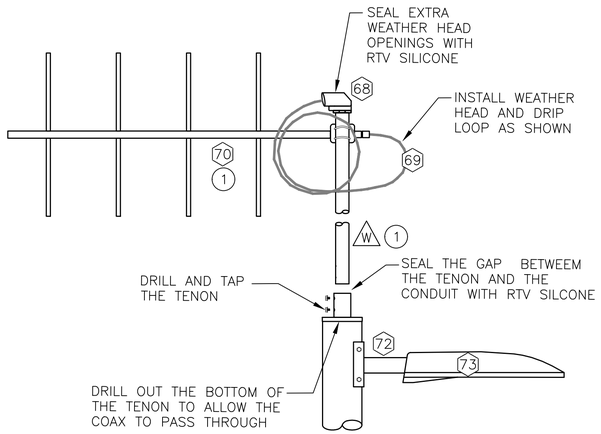
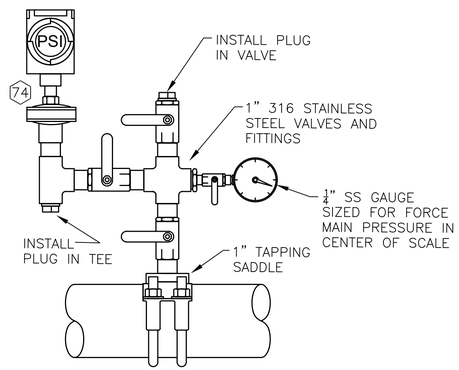
SHEET
E-10
X OF X

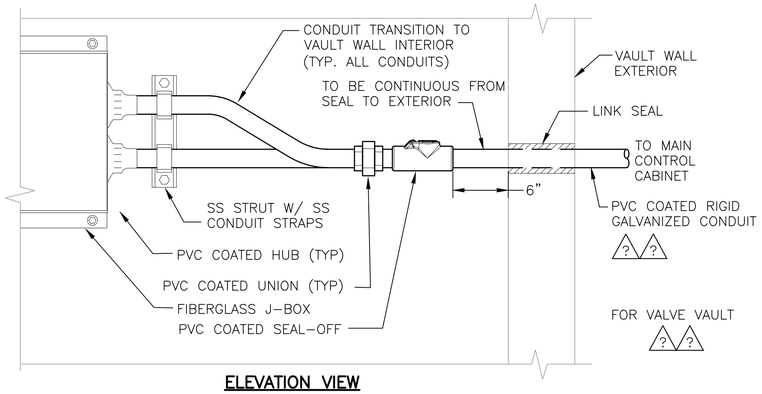
LIGHT POLE INSTALLATION DETAIL



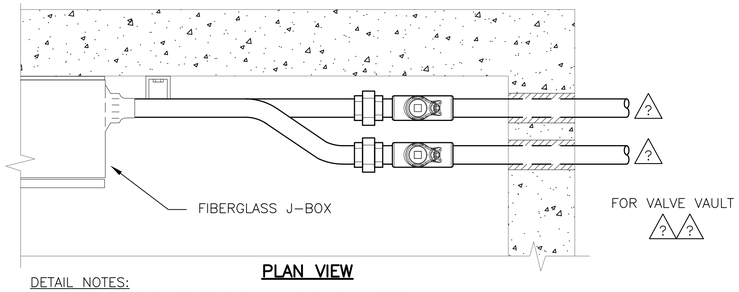
PSI TRANSMITTER INSTALLATION DETAIL



VALVE VAULT AND FLOWMETER VAULT SEAL-OFF INSTALLATION DETAIL



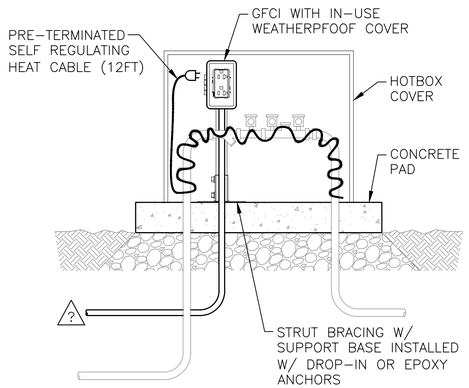
ELEVATION VIEW



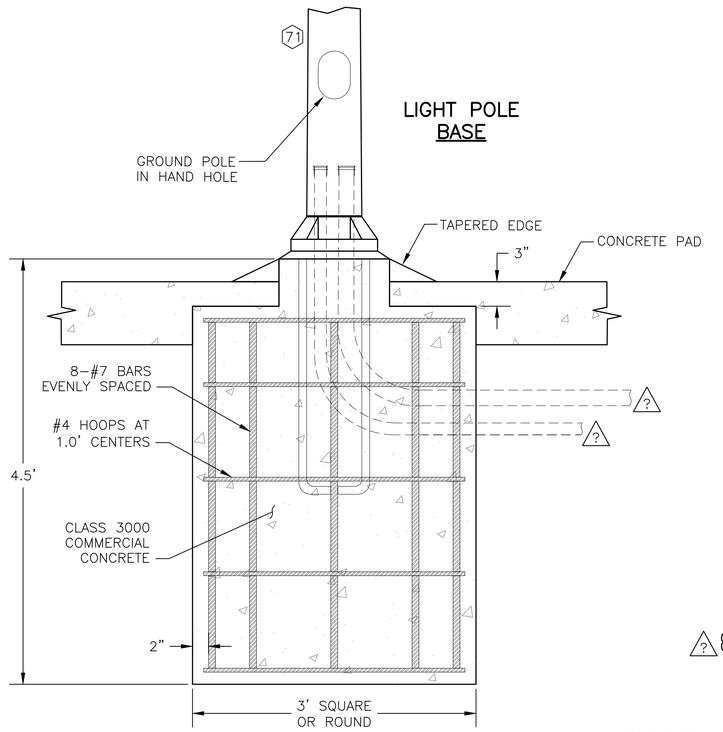
PLAN VIEW

DETAIL NOTES:
1. SEPARATE CONDUCTORS THROUGH THE SEAL-OFFS WITH APPLETON FOI FIBER FILLER AND FILL WITH APPLETON AC1A SEALING CEMENT.
2. SEAL SPARE CONDUIT WITH DUCT SEALING COMPOUND
3. USE COPPER COAT ON CONDUIT THREADS, UNION THREADS AND SEAL-OFF CAPS.

HOT BOX GFCI INSTALLATION DETAIL

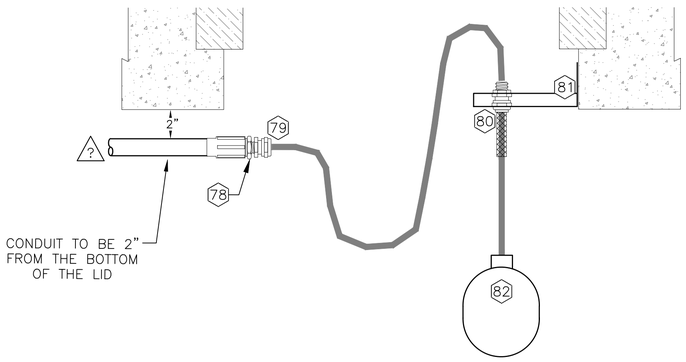


LIGHT POLE BASE

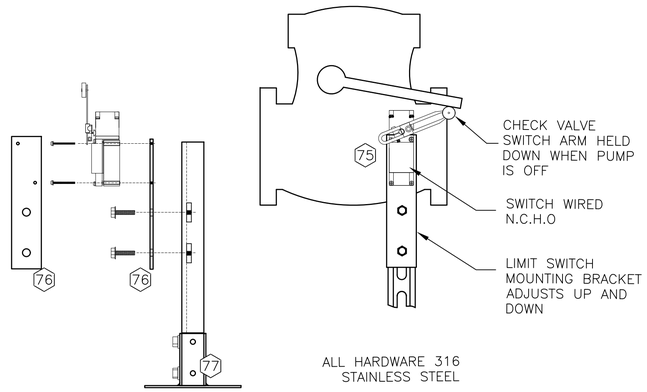


DETAIL NOTES:
1. THE FOUNDATION IS DESIGNED FOR 2000 PSF AVERAGE SOIL LATERAL BEARING PRESSURE.
2. BOLT PATTERN PER MANUFACTURER'S SPECIFICATIONS.
3. FOR DETAILS NOT SHOWN USE MANUFACTURER'S SPECIFICATIONS AND DETAILS.

HIGH BALL INSTALLATION DETAIL



SWING CHECK VALVE INSTALLATION DETAIL



ALL HARDWARE 316 STAINLESS STEEL

KEY NOTES

1. OVERALL HEIGHT AND AIMING OF ANTENNA SHALL BE COORDINATED WITH CITY PERSONNEL.

SHEET LAYOUT KEY:

68. 1-1/2" WEATHER HEAD
69. ANTENNA CABLING
70. ANTENNA
71. 16' LIGHT POLE WITH TENNON TOP
72. LUMINAIRE MOUNTING BRACKET
73. LED LUMINAIRE
74. PRESSURE TRANSMITTER ASSEMBLY
75. CHECK VALVE SWITCH ASSEMBLY
76. LIMIT SWITCH MOUNTING BRACKET
77. LIMIT SWITCH POST BASE
78. 1" X 1/2 " SS REDUCER BUSHING
79. SS CORD GRIP
80. SS CORD GRIP WITH STRAIN RELIEF
81. HIGH BALL MOUNTING BRACKET
82. HIGH BALL

△ CONDUIT PENETRATIONS. SEE CONDUIT SCHEDULE SHEET

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FIELD ELECTRICIAN CONSTRUCTION DETAILS SHEET 1

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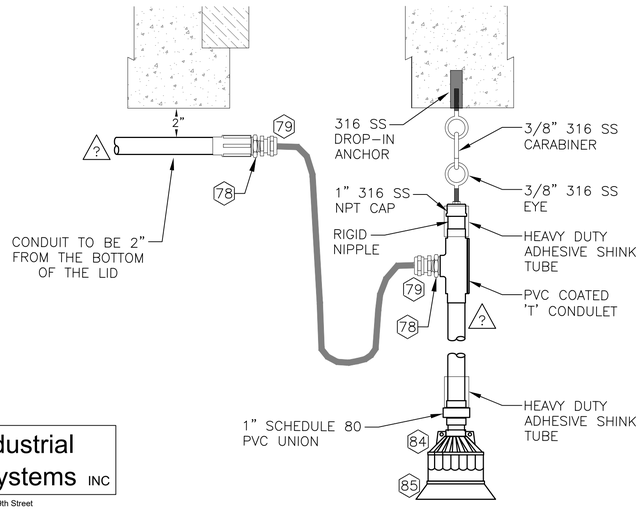
SHEET
E-11
X OF X

LEVEL TRANSDUCER INSTALLATION DETAIL



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SHEET LAYOUT KEY:

- 78 1" X 1/2 " SS REDUCER BUSHING
- 79 SS CORD GRIP
- 84 LEVEL TRANSDUCER
- 85 SUBMERGENCE SHIELD
- △ CONDUIT PENETRATIONS. SEE CONDUIT SCHEDULE SHEET

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FIELD ELECTRICIAN CONSTRUCTION DETAILS SHEET 2

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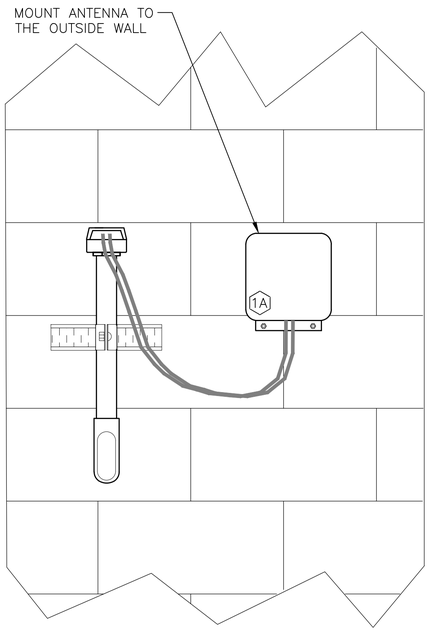
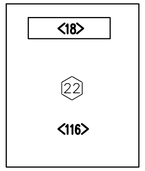
SHEET
E-12
X OF X

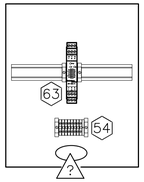
CELL ANTENNA INSTALLATION DETAIL



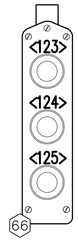
INTRINSICALLY SAFE RELAY PANEL EXTERIOR

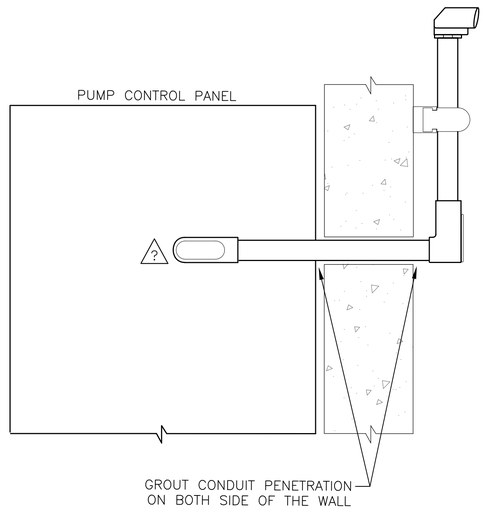


INTRINSICALLY SAFE RELAY PANEL INTERIOR



PUMP JOG PENDANT





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SHEET LAYOUT KEY:

- 1A — CELL MODEM
- 22 — INSTRINSICALLY SAFE RELAY PANEL ENCLOSURE
- 54 — TERMINAL BLOCKS
- 63 — INTRINSICALLY SAFE RELAY
- 66 — PUMP JOG PENDANT
- △ — CONDUIT PENETRATIONS. SEE CONDUIT SCHEDULE SHEET
- ◇◇ — SEE LABEL SCHEDULE SHEET

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FIELD ELECTRICIAN CONSTRUCTION DETAILS SHEET 3

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SHEET
E-13
X OF X

SPACE RESERVED FOR
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APPROVED MATERIALS LIST (BOM) SHEET 1

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SHEET
E-14
X OF X

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APPROVED MATERIALS LIST (BOM) SHEET 2

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SHEET
E-15
X OF X

Phenolic Legends

1-1/2" X 7-1/2" Red background with white 3/8" letters, text to include:	4-1/2" X 7-1/2" Black background with white 1/4" letters, text to include:	1-1/2" X 7-1/2" Black background with white 3/16" letters, text to include:	1-1/2" X 6" Black background with white 1/2" letters, text to include:
<1> 277/480 3ø 200 AMPS	<2> SERVICE/METER DISCONNECT FEEDS ATS IN ELECTRICAL ROOM FED BY STANDBY GENERATOR NORTHEAST OF BUILDING	<3> LIFT STATION #3 4406 26TH AVE SE LACEY, WA 98503	<4> NOT USED
1-1/2" X 5" Red background with white 1/4" letters, text to include:	1-1/2" X 5" Black background with white 3/8" letters, text to include:	1-1/2" X 6" Black background with white 3/8" letters, text to include:	3/4" X 2-1/2" Black background with white 3/8" letters, text to include:
<5> SERVICE DISCONNECT ON THE EXTERIOR OF BUILDING	<6> BREAKER PANEL	<7> PUMP CONTROL PANEL	<8> PUMP 1
3/4" X 2-1/2" Black background with white 3/8" letters, text to include:	3/4" X 2-1/2" Black background with white 3/8" letters, text to include:	1-3/4" X 2" Black background with white 5/32" letters, text to include:	1-3/4" X 2" Black background with white 5/32" letters, text to include:
<9> PUMP 2	<10> PUMP 3	<12> CONTROL POWER	<13> HIGH WET WELL OVERRIDE SELECT P1 P2
1-3/4" X 2" Black background with white 5/32" letters, text to include:	1-3/4" X 2" Black background with white 5/32" letters, text to include:	1-3/4" X 2" Black background with white 5/32" letters, text to include:	3/4" X 3" Black background with white 3/16" letters, phenolic width to match HOA width, text to include:
<13> HIGH WET WELL OVERRIDE SELECT 1+3 2+3 1+2	<14> HIGH WET WELL LEVEL RESET	<15> HAND-OFF-AUTO	<16> PUMP 1
3/4" X 3" Black background with white 3/16" letters, phenolic width to match HOA width, text to include:	3/4" X 3" Black background with white 3/16" letters, phenolic width to match HOA width, text to include:	1-1/2" X 5" Black background with white 3/8" letters, text to include:	1-1/2" X 5" Black background with white 3/8" letters, text to include:
<17> PUMP 2	<18> PUMP 3	<19>	<20> ISR PANEL
1-1/2" X 5" Black background with white 3/8" letters, text to include:	1-1/2" X 5" Red background with white 3/16" letters, text to include:	1-1/2" X 5" Black background with white 3/8" letters, text to include:	
<21> ISOLATION PEDESTAL	<22> NOT USED	<23>	

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PHENOLIC LEGENDS

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SHEET
E-16
X OF X

P:\Projects\21.65.01_MSA_Lacey_LS3_Relacement\DWG\21-3171-WA-E-16.dwg E-16 2/14/2022 9:30 AM ROBERTC 23.1s (LMS Tech)

Vinyl Labels

Emedco part number SQS116 text to include:	Emedco part number SQS9 text to include:	Emedco part number SQ3784 text to include:	
<25> DANGER 480 VOLTS	<26> CAUTION THIS EQUIPMENT IS SUPPLIED BY MORE THAN ONE POWER SOURCE	<35> WARNING ARC FLASH AND SHOCK HAZARD APPROPRIATE PPE REQUIRED FAILURE TO COMPLY CAN RESULT IN DEATH OR INJURY.	

White background with 18 point black font, text to include:

<27> PHASE MONITOR	<28> TVSS	<29> F1 F2 F3 KTK-R-1/10	<30> CB-TVSS	<31> ESW1	<32> ESW2	<33> UPS	<34> AREA LIGHT
<36> PS-1	<37> PS-2	<38> CBL	<39> CB-UPS	<40> CB-SPR	<42> LPC	<44> CB-LPC	

White background with black font, text to include: (label to include fuse name, type and size)

<45> DCF-R TYPE SIZE	<46> DCF-EW TYPE SIZE	<47> DCF-CM TYPE SIZE	<48> DCF-ES TYPE SIZE	<49> DCF-PV TYPE SIZE	<50> DCF-DI TYPE SIZE	<51> DCF-DO TYPE SIZE	<52> DCF–SP TYPE SIZE
<53> DCF-FLD TYPE SIZE	<54> DCF–AI0 TYPE SIZE	<55> DCF–AI1 TYPE SIZE	<56> DCF-AI2 TYPE SIZE	<57> DCF-AI3 TYPE SIZE	<68> DCF-AI4 TYPE SIZE	<69> DCF-AI5 TYPE SIZE	<70> DCF-AI6 TYPE SIZE

White background with 18 point black font, text to include: {Mount on back plate}

<58> CR-5–PULSE	<59> TD-1	<60> TD-2	<61> TD-3	<63> CR-1	<64> CR-2	<65> CR-3	<66> CR-4
<67> CR-4A		<71>	<72> CR-P1	<73> CR-P2	<74> CR-P3	<75> CR-RSF1	<76> CR-RSF2
<77> CR-RSF3							

White background with black font, text to include: (label to include fuse name, type and size)

<78> ACF-PLC TYPE SIZE	<79> ACF–P1 TYPE SIZE	<80> ACF-LC TYPE SIZE	<81> ACF–FM TYPE SIZE	<82> ACF–P2 TYPE SIZE	<83> ACF–AC1 TYPE SIZE	<84> ACF–IS1 TYPE SIZE	<85> DCF-AI7 TYPE SIZE
<86> DCF-AO1 TYPE SIZE	<87> DCF-AO2 TYPE SIZE	<88> DCF-AO3 TYPE SIZE	<89> DCF-AO4 TYPE SIZE				

White background with 18 point black font, text to include:

<90> SEAL FAIL 1	<91> SEAL FAIL 2	<92> SEAL FAIL 3	<94> CB1	<95> CB2	<96> CB3	<98> P1	<99> SS-1
<100> SS-2	<101> SS-3	<102> P2					

White background with 24 point black font, text to include:

<104> NOT USED	<105> NOT USED	<106> NOT USED	<107> RPBA HEAT TAPE
<107> RPBA/AIR RELEASE HEAT TAPE	<108> ISOLATION PEDESTAL HEATER	<109> PUMP PANEL 120 VAC CONTROL POWER	<110> UPS RECEPTACLE
<111> OUTSIDE AREA LIGHT	<112> GENERATOR BATTERY CHARGER	<113> GENERATOR BLOCK HEATER	

Red or yellow background with black 5/32" letters, text to include:

<116> WARNING: To prevent ignition of flammables or combustible atmospheres, disconnect power before servicing. This panel provides intrinsically safe circuit extensions for use in CLASS 1 GROUP D HAZARDOUS LOCATIONS when connected per (Control System Manufacturer) drawing package (number).	<117> Apply red tape to the floor of the MAIN CONTROL CABINET to designate intrinsically safe area. (Only intrinsically safe circuits are allowed in this area. No conduit should be closer than 2" to the red line.)

White background with 18 point black font, text to include:

<118> HIGH BALL	<119> PUMP 1	<120> PUMP 2	<121> PUMP 3				

White background with black font, text to include: (Sized to fit)

<123> PUMP 1	<124> PUMP 2	<125> PUMP 3	<127> EMERGENCEY POWER	<128> LOAD BANK	<129> BATTERY CHARGER	<130> BLOCK HEATER	<131> NOT USED

Industrial Systems INC
12119 NE 99th Street
Suite #2090
Vancouver, Washington 98682
Phone: (360) 718-7267
Fax: (360) 952-8958
e-mail: ia@industrialsystems-inc.com
OR CCB #196597 WA #INDUSSI880K9
AK #1018436
PROJECT#:21.65.01

60% SUBMITTAL

NO.	DATE	BY	REVISION

NOTICE
0 ½ 1
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RSC DESIGNED
JLB DRAWN
TBC CHECKED

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February 2022
Murraysmith
www.murraysmith.us

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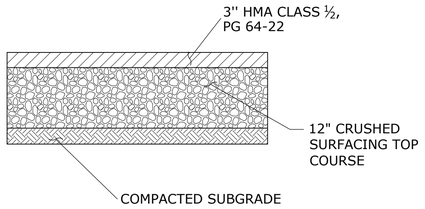
CITY OF LACEY

CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

VINYL LABELS

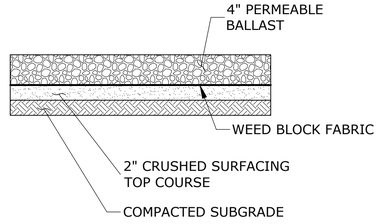
PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
E-17
X OF X



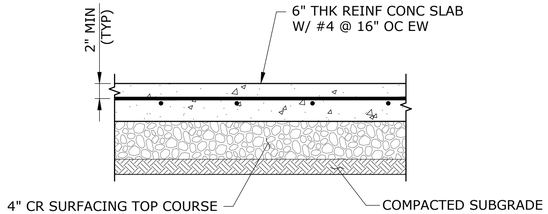
ASPHALT PAVEMENT 1

SCALE: NTS



GRAVEL SURFACING 2

SCALE: NTS

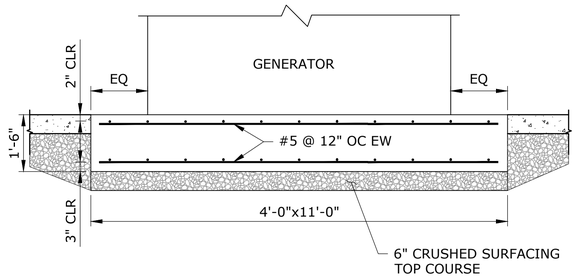


NOTE:

1. CONCRETE SHALL BE COMMERCIAL CONCRETE CLASS 3000 OR BETTER, REINFORCING STEEL ASTM A615 GRADE 60.

CONCRETE SURFACING 3

SCALE: NTS



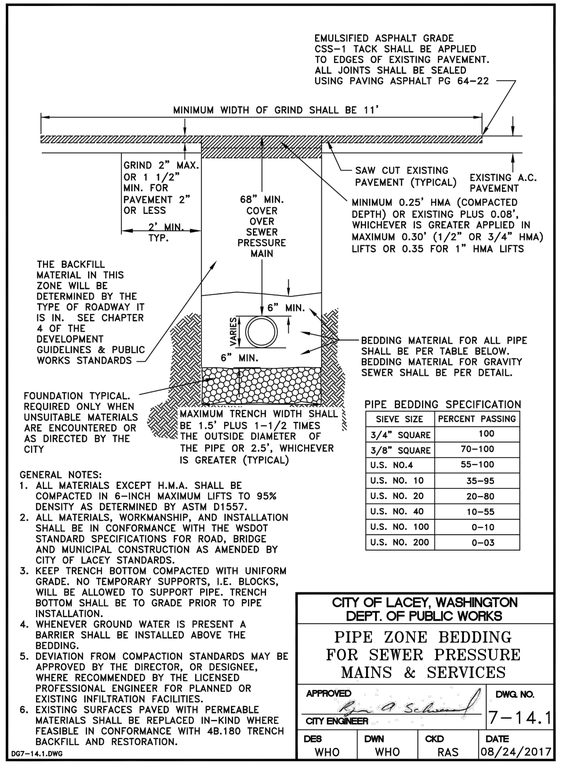
NOTE:

1. GENERATOR SUPPLIER TO DESIGN PAD DIMENSIONS AND PROVIDE ANCHORAGE DESIGN.

2. CONCRETE SHALL BE COMMERCIAL CONCRETE CLASS 3000 OR BETTER, REINFORCING STEEL ASTM A615 GRADE 60.

GENERATOR PAD 4

SCALE: NTS



PIPE BEDDING SPECIFICATION

SIEVE SIZE	PERCENT PASSING
3/4" SQUARE	100
3/8" SQUARE	70-100
U.S. NO.4	55-100
U.S. NO. 10	35-95
U.S. NO. 20	20-80
U.S. NO. 40	10-55
U.S. NO. 100	0-10
U.S. NO. 200	0-03

GENERAL NOTES:

1. ALL MATERIALS EXCEPT H.M.A. SHALL BE COMPACTED IN 6-INCH MAXIMUM LIFTS TO 95% DENSITY AS DETERMINED BY ASTM D1557.
2. ALL MATERIALS, WORKMANSHIP, AND INSTALLATION SHALL BE IN CONFORMANCE WITH THE WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION AS AMENDED BY CITY OF LACEY STANDARDS.
3. KEEP TRENCH BOTTOM COMPACTED WITH UNIFORM GRADE. NO TEMPORARY SUPPORTS, I.E. BLOCKS, WILL BE ALLOWED TO SUPPORT PIPE. TRENCH BOTTOM SHALL BE TO GRADE PRIOR TO PIPE INSTALLATION.
4. WHENEVER GROUND WATER IS PRESENT A BARRIER SHALL BE INSTALLED ABOVE THE BEDDING.
5. DEVIATION FROM COMPACTION STANDARDS MAY BE APPROVED BY THE DIRECTOR, OR DESIGNEE, WHERE RECOMMENDED BY THE LICENSED PROFESSIONAL ENGINEER FOR PLANNED OR EXISTING INFILTRATION FACILITIES.
6. EXISTING SURFACES PAVED WITH PERMEABLE MATERIALS SHALL BE REPLACED IN-KIND WHERE FEASIBLE IN CONFORMANCE WITH 4B.180 TRENCH BACKFILL AND RESTORATION.

D07-14.1.DWG

CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

PIPE ZONE BEDDING FOR SEWER PRESSURE MAINS & SERVICES

APPROVED CITY ENGINEER	DWG. NO.
	7-14.1

DES	DWN	CKD	DATE
WHO	WHO	RAS	08/24/2017

TRENCH RESTORATION FOR PAVED AREAS 5

SCALE: NTS

60% SUBMITTAL

NO.	DATE	BY	REVISION

NOTICE

0 ½ 1

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MCD DESIGNED
MNF DRAWN
PBC CHECKED

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PER WAC 196-23-020(3)
February 4, 2022
48352
REGISTERED PROFESSIONAL ENGINEER
murraysmith

murraysmith

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CITY OF LACEY

CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

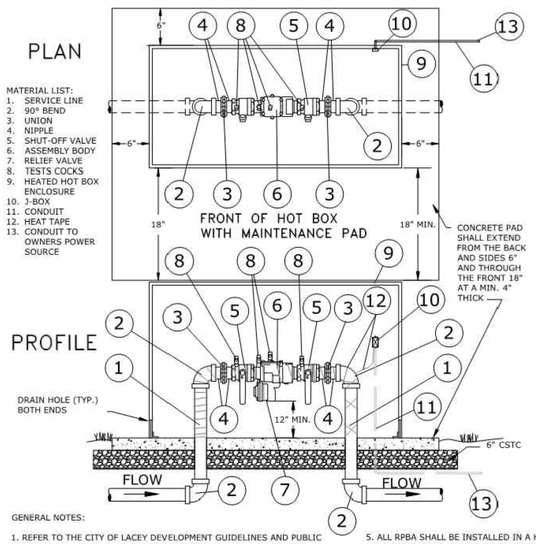
TYPICAL DETAILS - 1

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET **D-1**

47 of 51

K:\TAC_Projects\21\3171 - Lacey - LS3 Replacement\CAD\Sheets\21-3171-WA-D1.dwg D-1 2/18/2022 3:14 PM MATT.ESTEP 23.0s (LMS Tech)



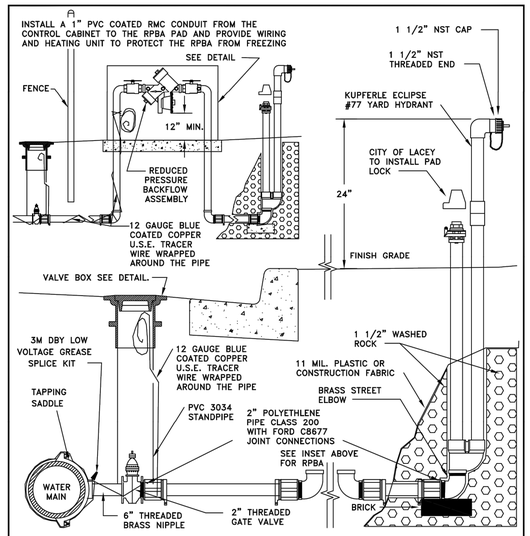
GENERAL NOTES:

1. REFER TO THE CITY OF LACEY DEVELOPMENT GUIDELINES AND PUBLIC WORKS STANDARDS, SECTION 6.110, BACK-FLOW PREVENTION, FOR SELECTION AND INSTALLATION DETAILS.
2. THE BPA (BACKFLOW PREVENTION ASSEMBLY) INSTALLATION SHALL BE INSPECTED AND APPROVED BY A CITY OF LACEY CROSS-CONNECTION CONTROL SPECIALIST (CCS), PRIOR TO TESTING.
3. WHEN THE INSTALLATION HAS BEEN APPROVED BY THE LACEY CCS, THE RPBA MUST PASS A FUNCTIONALITY TEST BY A WASHINGTON STATE CERTIFIED BAT AS PER DOH STANDARDS.
4. DO NOT INSTALL IN AREA SUBJECT TO FLOODING.
5. ALL RPBA SHALL BE INSTALLED IN A HOT BOX EQUIPPED WITH ELECTRICAL COMPONENTS (CONDUITS, WIRING, ETC.) AND POWER SUPPLIED BY THE OWNER TO PREVENT THE UNIT FROM FREEZING.
6. ALL PIPING AND FITTINGS SHALL BE DOMESTIC BRASS MANUFACTURED IN THE U.S.A.
7. DRAIN HOLE OPENINGS SHALL BE 1 1/2 TIMES THE DIAMETER OF THE SUPPLY LINE.
8. THE HOT BOX SHALL BE NEUTRAL BEIGE.

REDUCED PRESSURE BACKFLOW ASSEMBLY FOR 3" OR SMALLER (OUTDOOR APPLICATION)

1 / -

SCALE: NTS



GENERAL NOTES:

1. THE WATER MAIN IS LOCATED 6' NORTH OR EAST OF THE CENTERLINE.
2. THE BROKEN LINES INDICATE A MISSING DISTANCES. ALL DISTANCES SHALL BE SHOWN ON THE PLANS.
3. TWO (2) COATS OF RED EPOXY PAINT IS REQUIRED AFTER INSTALLATION.
4. INSTALL A RPBA WITHIN THE FENCED AREA WITH NO OBSTRUCTIONS AROUND IT. SEE DETAIL.
5. THE WASH HYDRANT SHALL BE INSTALLED WITHIN THE FENCED AREA OF A LIFT STATION.
6. THE ENCLOSURE FOR THE RPBA SHALL BE A HOT BOX HB-200 WITH HEAT COIL.
7. TAP PER DETAIL.

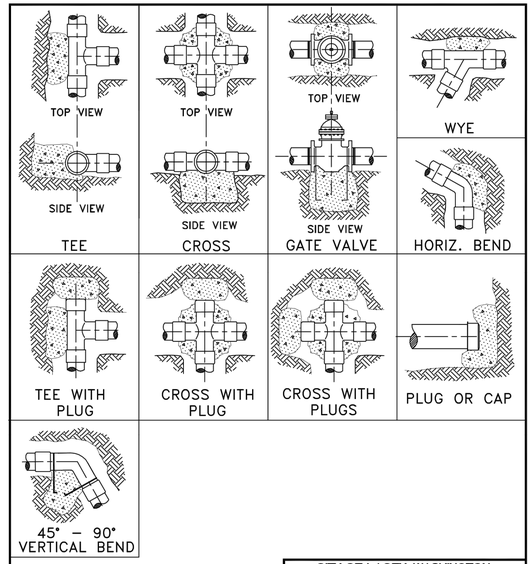
D07-78.0.DWG

CITY OF LACEY, WASHINGTON DEPT. OF PUBLIC WORKS			
LIFT STATION WASH HYDRANT			
APPROVED CITY ENGINEER			DWG. NO. 7-78.0
DES. WHO	DWN. WHO	CKD. RAS	DATE 08/24/2017

LIFT STATION WASH HYDRANT

2 / -

SCALE: NTS



GENERAL NOTES:

1. CONCRETE THRUST BLOCKING TO BE POURED AGAINST UNDISTURBED EARTH.
2. PLASTIC BARRIER SHALL BE PLACED BETWEEN ALL THRUST BLOCKS AND FITTIINGS.
3. ANCHOR REBAR SHALL BE 5/8" MINIMUM DIAMETER

D06-14.DWG

CITY OF LACEY, WASHINGTON DEPT. OF PUBLIC WORKS			
STANDARD BLOCKING DETAIL			
APPROVED CITY ENGINEER			DWG. NO. 6-14
DES. LRW	DWN. RLM	CKD. RAS	DATE 8/27/09

THRUST LOADS

THRUST AT FITTINGS IN POUNDS AT 200 POUNDS PER SQUARE INCH OF WATER PRESSURE

PIPE DIAMETER	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND	DEAD END OR TEE
4"	3,600	2,000	1,000	500	2,600
6"	8,000	4,400	2,300	1,200	5,700
8"	14,300	7,700	4,000	2,000	10,100
10"	22,300	12,100	6,200	3,100	15,800
12"	32,000	17,400	8,900	4,500	22,700
14"	43,600	23,600	12,100	6,100	30,800
16"	57,000	30,800	15,700	7,900	40,300

NOTES:

1. BLOCKING SHALL BE COMMERCIAL CONCRETE POURED IN PLACE AGAINST UNDISTURBED EARTH. FITTING SHALL BE ISOLATED FROM CONCRETE THRUST BLOCK WITH PLASTIC OR SIMILAR MATERIAL.
2. TO DETERMINE THE BEARING AREA OF THE THRUST BLOCK IN SQUARE FEET (S.F.):
   EXAMPLE : 12" - 90° BEND IN SAND AND GRAVEL
   32,000 LBS ÷ 3000 LB/S.F. = 10.7 S.F. OF AREA
3. AREAS MUST BE ADJUSTED FOR OTHER PIPE SIZE, PRESSURES AND SOIL CONDITIONS.
4. BLOCKING SHALL BE ADEQUATE TO WITHSTAND FULL TEST PRESSURE AS WELL AS TO CONTINUOUSLY WITHSTAND OPERATING PRESSURE UNDER ALL CONDITIONS OF SERVICE.

SAFE SOIL BEARING LOADS

FOR HORIZONTAL THRUSTS WHEN THE DEPTH OF COVER OVER THE PIPE EXCEEDS 2 FEET

SOIL	POUNDS PER SQUARE FOOT
MUCK, PEAT	0
SOFT CLAY	1,000
SAND	2,000
SAND & GRAVEL	3,000
SAND & GRAVEL CEMENTED WITH CLAY	4,000
HARD SHALE	10,000

D06-15.DWG

CITY OF LACEY, WASHINGTON DEPT. OF PUBLIC WORKS			
THRUST LOADS			
APPROVED CITY ENGINEER			DWG. NO. 6-15
DES. LRW	DWN. RLM	CKD. RAS	DATE 8/27/09

STANDARD BLOCKING DETAIL AND THRUST LOADS

3 / -

SCALE: NTS

60% SUBMITTAL

NO.	DATE	BY	REVISION

NOTICE
0 ½ 1
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MNF DRAWN
PBC CHECKED

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February 2022
48352 REGISTERED PROFESSIONAL ENGINEER
murraysmith

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CITY OF LACEY

CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

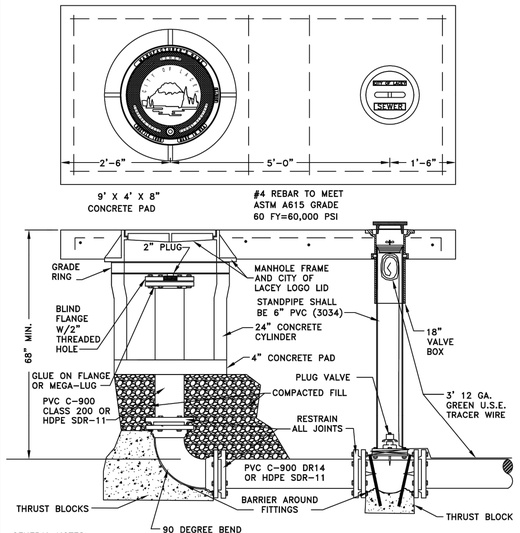
TYPICAL DETAILS - 2

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET **D-2**

48 of 51

K:\TAC_Projects\21\3171 - Lacey - LS3 Replacement\CAD\Sheets\21-3171-WA-D1.dwg D-2 2/18/2022 3:14 PM MATT.ESTEP 23.0s (LMS Tech)



GENERAL NOTES:
1. FOR VALVE BOX AND VALVE STEM RISER REQUIREMENTS SEE DETAIL.
2. THE PIG LAUNCH SIZES SHALL BE THE SAME SIZE AS THE MAIN.
3. THE MANHOLE FRAME AND COVER SHALL BE THE CITY OF LACEY "LOGO" LID SEE DETAIL.
4. PIG LAUNCH 10" OR LARGER SHALL REQUIRE SPECIAL DESIGN AND APPROVAL BY THE CITY AND MAY REQUIRE A LARGER MANHOLE LID OPENING OR A SPECIAL VAULT.
5. IN A CUL-DE-SAC SCENARIO THE LAUNCH PORT SHALL END AT THE MIDDLE OF THE SAC.

CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

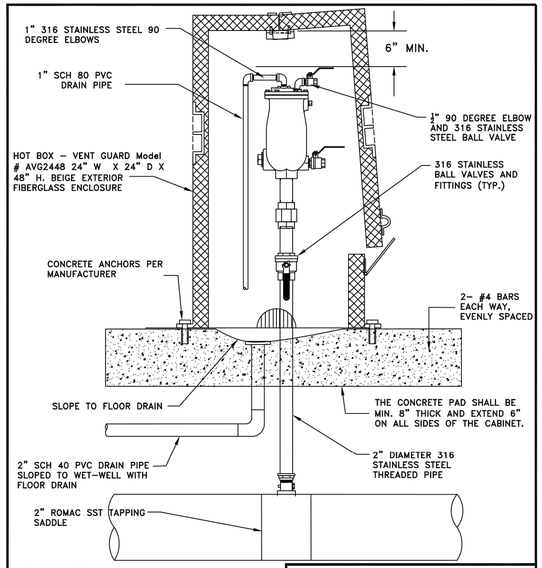
4" THRU 8" PIG LAUNCH ASSEMBLY

APPROVED / CITY ENGINEER	DWG. NO.
	7-21.0

DES.	DWN.	CKD.	DATE
WHO	WHO	RAS	08/24/2017

DG7-21.0.DWG

LAUNCH PORT 4" THRU 10"
SCALE: NTS
1 / -



GENERAL NOTES:
1. VALVE ASSEMBLY SHALL BE SET AT THE HIGH POINT OF THE LINE.
2. AIR RELEASE VALVES SHALL BE VAL-MATIC MODEL 801A WITH REGULATED EXHAUST AND MAY REQUIRE A LOW PRESSURE SEAT. ALTERNATE MODEL NUMBERS MAY BE REQUIRED BY THE CITY DEPENDING ON THE SPECIFIC APPLICATION.
3. AIR RELEASE MUST BE INSULATED WITH DeKORRA INSULATION BOOT PART NUMBER 610 CUSTOM SIZE 18" WIDE BY 36" TALL WITH OPENING ON THE 18" END.

CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

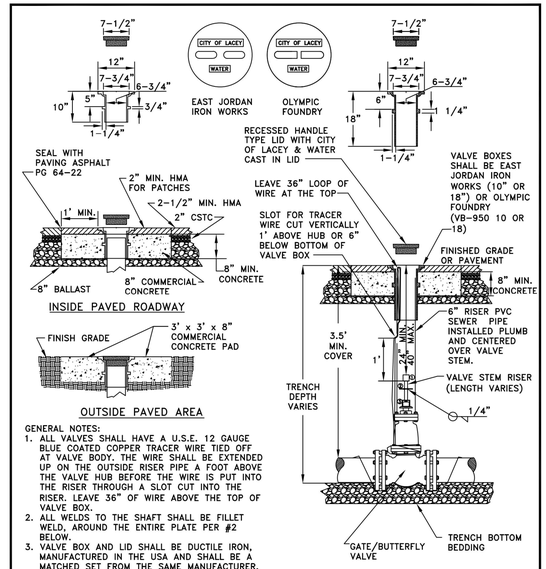
LIFT STATION AIR AND VACUUM RELEASE

APPROVED / CITY ENGINEER	DWG. NO.
	7-77.0

DES.	DWN.	CKD.	DATE
EBK	WHO	RAS	08/24/2017

DG7-77.0.DWG

AIR RELEASE VALVE (ARV)
SCALE: NTS
2 / -



GENERAL NOTES:
1. ALL VALVES SHALL HAVE A U.S.E. 12 GAUGE BLUE COATED COPPER TRACER WIRE TIED OFF AT VALVE BODY. THE WIRE SHALL BE EXTENDED UP ON THE OUTSIDE RISER PIPE A FOOT ABOVE THE VALVE HUB BEFORE THE WIRE IS PUT INTO THE RISER THROUGH A SLOT CUT INTO THE RISER. LEAVE 36" OF WIRE ABOVE THE TOP OF VALVE BOX.
2. ALL WELDS TO THE SHAFT SHALL BE FILLET WELD, AROUND THE ENTIRE PLATE PER #2 BELOW.
3. VALVE BOX AND LID SHALL BE DUCTILE IRON, MANUFACTURED IN THE USA AND SHALL BE A MATCHED SET FROM THE SAME MANUFACTURER.
4. EXISTING SURFACES PAVED WITH PERMEABLE MATERIALS SHALL BE REPLACED IN-KIND WHERE FEASIBLE IN CONFORMANCE WITH 4B.180 TRENCH BACKFILL AND RESTORATION.

VALVE STEM EXTENSION LEGEND
① VALVE OPERATING NUT OR 1-7/8" X 1-7/8" X 2" HIGH GRADE STEEL WELDED TO GUIDE PLATE.
② 3/16" THICK X 5 1/5" DIA STEEL GUIDE PLATE WELDED TO RISER SHAFT.
③ 2"X2"X 3/16" SQUARE STRUCTURAL STEEL TUBING TO FIT OPERATING NUT. LENGTH AS REQUIRED.

CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

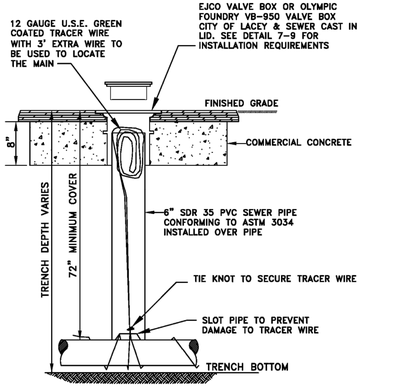
STANDARD VALVE BOX INSTALLATION

APPROVED / CITY ENGINEER	DWG. NO.
	6-12.0

DES	DWN	CKD	DATE
WHO	WHO	RAS	08/24/2017

DG6-12.0.DWG

STANDARD VALVE BOX
SCALE: NTS
3 / -



GENERAL NOTE:
1. TRACER WIRE ACCESS PORT SHALL BE INSTALLED EVERY 500 FEET WHEN NO APPURTENANCES ARE CONNECTED TO IT.

CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

LOCATE WIRE ACCESS PORT

APPROVED / CITY ENGINEER	DWG. NO.
	7-9.1

DES	DWN	CKD	DATE
EHA	WHO	RAS	12/15/2014

DG7-9.1.DWG

LOCATE WIRE ACCESS PORT
SCALE: NTS
4 / -

60% SUBMITTAL

NO.	DATE	BY	REVISION

NOTICE
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MNF DRAWN
PBC CHECKED

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February 2022

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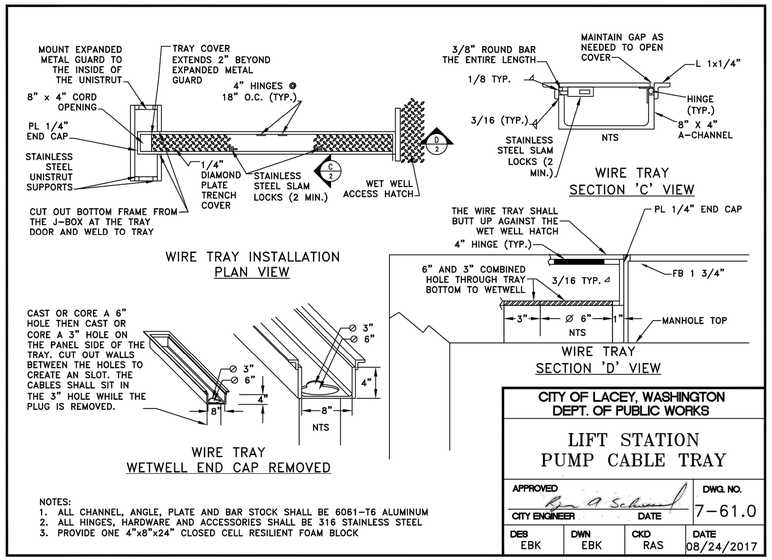
CITY OF LACEY

CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

TYPICAL DETAILS - 3

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET **D-3**



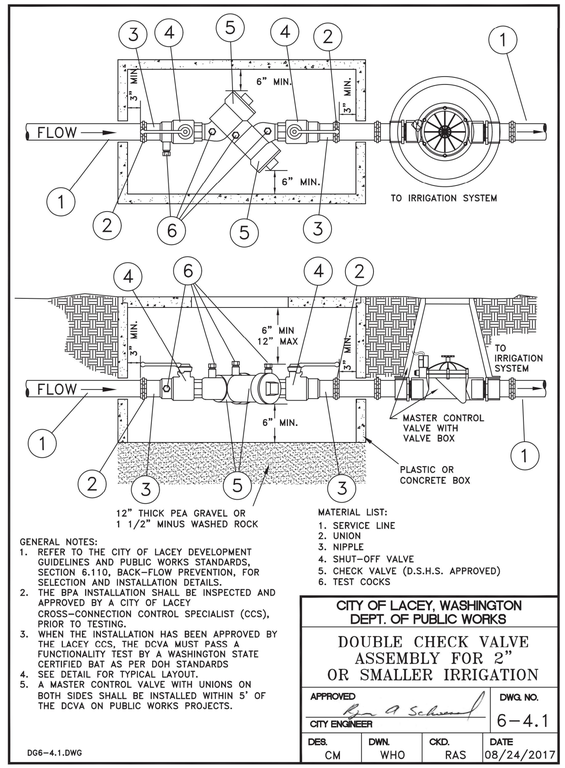
CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

LIFT STATION
PUMP CABLE TRAY

APPROVED	DWG. NO.
CITY ENGINEER / DATE	7-61.0

DES.	DWN.	CKD.	DATE
EBK	EBK	RAS	08/24/2017

PUMP CABLE TRAY (1 / -)
SCALE: NTS



GENERAL NOTES:
1. REFER TO THE CITY OF LACEY DEVELOPMENT GUIDELINES AND PUBLIC WORKS STANDARDS, SECTION 8.110, BACK-FLOW PREVENTION, FOR SELECTION AND INSTALLATION DETAILS.
2. THE BPA INSTALLATION SHALL BE INSPECTED AND APPROVED BY A CITY OF LACEY CROSS-CONNECTION CONTROL SPECIALIST (CCS), PRIOR TO TESTING.
3. WHEN THE INSTALLATION HAS BEEN APPROVED BY THE LACEY CCS, THE DCVA MUST PASS A FUNCTIONALITY TEST BY A WASHINGTON STATE CERTIFIED BAT AS PER DOH STANDARDS
4. SEE DETAIL FOR TYPICAL LAYOUT.
5. A MASTER CONTROL VALVE WITH UNIONS ON BOTH SIDES SHALL BE INSTALLED WITHIN 5' OF THE DCVA ON PUBLIC WORKS PROJECTS.

MATERIAL LIST:
1. SERVICE LINE
2. UNION
3. NIPPLE
4. SHUT-OFF VALVE
5. CHECK VALVE (D.S.H.S. APPROVED)
6. TEST COCKS

DG6-4.1.DWG

CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

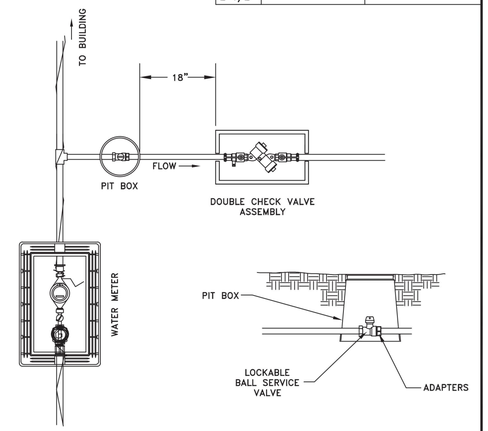
DOUBLE CHECK VALVE
ASSEMBLY FOR 2"
OR SMALLER IRRIGATION

APPROVED	DWG. NO.
CITY ENGINEER	6-4.1

DES.	DWN.	CKD.	DATE
CM	WHO	RAS	08/24/2017

DOUBLE CHECK VALVE ASSEMBLY (2 / -)
SCALE: NTS

LINE SIZE	BALL VALVE	VALVE BOX
3/4"	FORD FOB11-333W	CARSON MODEL 910-12
1"	FORD FOB11-444W	
1 1/2"	FORD FOB11-666W	
2"	FORD FOB11-777W	
2 1/2"	FORD FOB11-788W	



GENERAL NOTES:
1. THIS CONFIGURATION IS REQUIRED IF THE IRRIGATION SYSTEM DOES NOT HAVE IT'S OWN SEPARATE WATER METER.
2. DO NOT INSTALL IN AREAS SUBJECT TO FLOODING.

DG6-4.6.DWG

CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

IRRIGATION FOR
RESIDENTIAL DOMESTIC
SERVICE TYPE I

APPROVED	DWG. NO.
CITY ENGINEER	6-4.6

DES.	DWN.	CKD.	DATE
CM	WHO	RAS	12/15/2014

IRRIGATION SERVICE TYPE I (3 / -)
SCALE: NTS

60% SUBMITTAL

NO.	DATE	BY	REVISION

NOTICE
0 ½ 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

MCD DESIGNED
MNF DRAWN
PBC CHECKED

PRELIMINARY ONLY
NOT TO BE USED FOR CONSTRUCTION
February 2022
48352
murraysmith

murraysmith

Shaping our community together
CITY OF LACEY

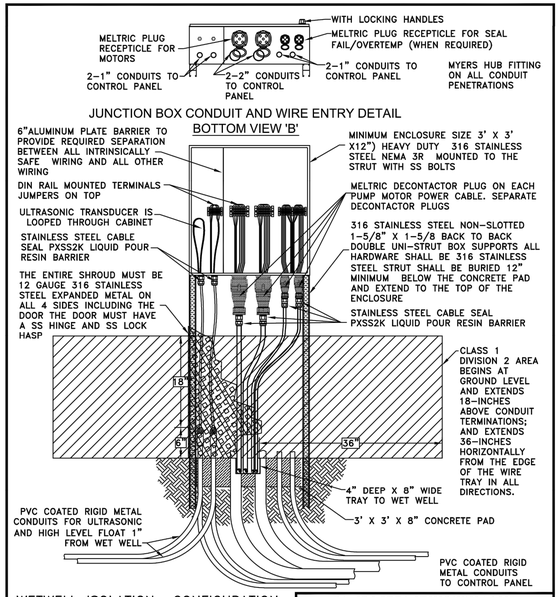
CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

TYPICAL DETAILS - 4

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET **D-4**

50 of 51

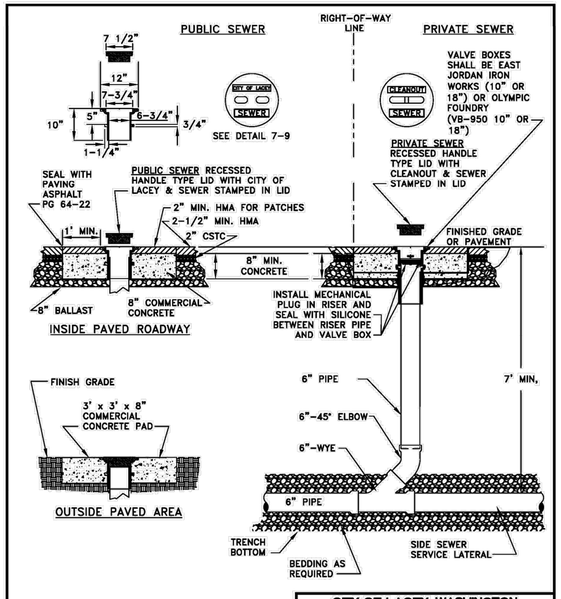


CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

WET WELL ELECTRICAL ISOLATION PEDESTAL

APPROVED Roger A Schaum CITY ENGINEER	DWG. NO. 7-17.3
DES WHO	DWN WHO
CKD RAS	DATE 12/15/2014

ISOLATION PEDESTAL (1)
SCALE: NTS

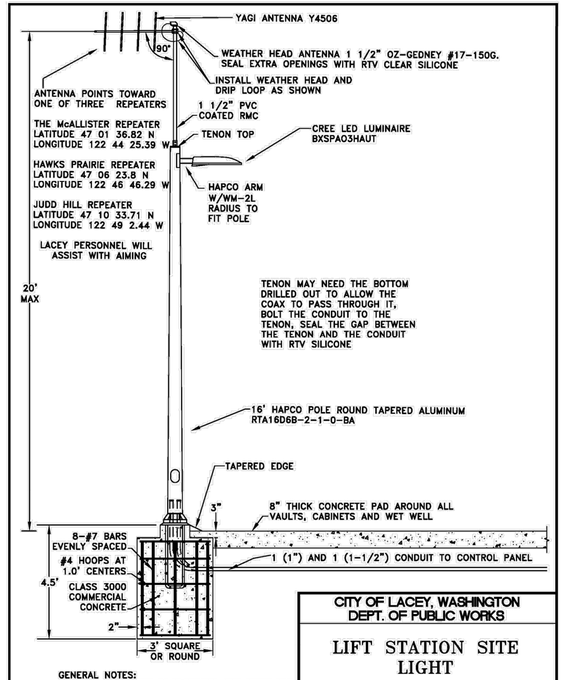


CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

CLEANOUT TYPE II PRIVATE

APPROVED Roger A Schaum CITY ENGINEER	DWG. NO. 7-5.1
DES WHO	DWN WHO
CKD RAS	DATE 12/15/2014

SEWER CONNECTION (2)
SCALE: NTS



CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

LIFT STATION SITE LIGHT

APPROVED Roger A Schaum CITY ENGINEER	DWG. NO. 7-17.5
DES WHO	DWN WHO
CKD RAS	DATE 12/15/2014

SITE LIGHT (3)
SCALE: NTS

60% SUBMITTAL

NO.	DATE	BY	REVISION

NOTICE
0 ½ 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

INITIAL1 DESIGNED
MNF DRAWN
INITIAL3 CHECKED

PRELIMINARY - NOT FOR CONSTRUCTION
DO NOT USE FOR CONSTRUCTION
PETER STATE OF WASHINGTON 46362 REGISTERED PROFESSIONAL ENGINEER
February 4, 2022

murraysmith

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CITY OF LACEY

CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

TYPICAL DETAILS - 5

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET **D-5**
51 of 51

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Attachment 2

Construction Stormwater Pollution Prevention Plan

Construction Stormwater Pollution Prevention Plan

For Lift Station 3 Replacement

City of Lacey

April 2022

Murraysmith

1145 Broadway Plaza
Suite 1010
Tacoma, WA 98402

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Attachments

Project Engineer's Certification

I hereby state that this Construction Stormwater Pollution Prevention Plan for Lift Station 3 Replacement has been prepared by me or under my supervision and meets the standard of care and expertise which is usual and customary in this community for professional engineers. I understand that the City of Lacey does not and will not assume liability for the sufficiency, suitability, or performance of Construction SWPPP BMPs prepared by me

Section 1

Project Overview

1.1 Project Description

This project is the replacement of lift station 3 (LS3), the oldest pump station in the City of Lacey. The existing LS3 is located within the right-of-way at the northeast corner of Golf Club Road SE and 26th Avenue SE in Lacey, Washington. The new lift station will be built at 4406 SE 26th Avenue, Lacey, WA (the site), directly east of the existing station. Table 1 summarizes the types and amounts of area involved in this project.

Table 1: Schedule of Areas

Description	Area (Square Feet)
Total Site Area	9,200
Increase of Impervious Area	2,500
Area Expected to be Disturbed by Construction Activities	7,300

1.2 Existing Site Conditions

1.2.1 General Site Conditions

The project site is currently occupied by a one-story, single-family residence. Existing hard surfaces include a driveway, concrete patio, detached shed, and the roof of the house; and amount to approximately 4,300 square feet (sf). The rest of the project site is generally lawn, with three trees, a hedge along the southern third of the eastern property line, and some small shrubs.

1.2.2 Site Soils and Topography

The topography of the existing site is relatively flat. A catch basin at the southwest corner of the site is the primary stormwater collection facility and conveys it generally south to Chambers Lake. Data from the Natural Resources Conservation Service (NRCS) indicates that soil on the site is likely Nisqually loam, which provides very rapid infiltration with very little natural water quality

treatment. More complete soils data will be provided upon receipt of the geotechnical exploration report.

1.3 Adjacent and Critical Areas

Confirmation of the presence of Nisqually soils on the project site would classify the site as a Category 1 critical aquifer recharge area (CARA). Projects within CARAs may be required to provide treatment for metals and phosphorous prior to infiltration or discharge, as applicable to the site and extent of CARA. The project will only utilize infiltration for the downspout of the roof, which is not anticipated to contain elevated levels of metals or phosphorous.

The project site is not within a wellhead protection area, nor is there a specific basin plan or water quality improvement program. The nearby area contains no wetlands, endangered species habitats, or other known environmentally critical or sensitive areas.

Section 2

Thirteen Elements

2.1 Introduction

To ensure full compliance with City stormwater standards and minimize impacts of construction activity on the environment BMPs must be chosen to satisfy each of the Thirteen Elements. If an element is not applicable to the project, written justification is provided for why it is not necessary.

2.2 Discussion of Elements

2.2.1 Element #1 Preserve Vegetation / Mark Clearing Limits

Before beginning land disturbing activities, including clearing and grading, all clearing limits will be clearly marked with high visibility silt fencing.

BMP C103 High Visibility Fence

- Purpose: High-visibility fencing is intended to restrict clearing to approved limits; prevent disturbance of sensitive areas, their buffers, and other areas required to be left undisturbed; limit construction traffic to designated construction entrances, exits, or internal roads; and protect areas where marking with survey tape may not provide adequate protection.

- Conditions of Use: To establish clearing limits plastic, fabric, or metal fence may be used at the boundary of sensitive areas, their buffers, and other areas required to be left uncleared and as necessary to control vehicle access to and on the site.

  Design Criteria: High-visibility plastic fence shall be composed of a high-density polyethylene material and shall be at least four feet in height. Posts for the fencing shall be steel or wood and placed every 6 feet on center (maximum) or as needed to ensure rigidity. The fencing shall be fastened to the post every six inches with a polyethylene tie. On long continuous lengths of fencing, a tension wire or rope shall be used as a top stringer to prevent sagging between posts. The fence color shall be high-visibility orange. The fence tensile strength shall be 360 lbs/ft using the ASTM D4595 testing method.

  If appropriate install fabric silt fence in accordance with BMP C233: Silt Fence to act as high-visibility fence. Silt fence shall be at least 3 feet high and must be highly visible to meet the requirements of this BMP. Metal fences shall be designed and installed according

to the manufacturer's specifications. Metal fences shall be at least 3 feet high and must be highly visible. Fences shall not be wired or stapled to trees.

- Maintenance Standards: If the fence has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.

2.2.2 Element #2 Establish Construction Access

There will be a single stabilized construction entrance. If the stabilized construction entrance is not effective in preventing tracking sediment onto roads, a wheel wash will be provided on site.

BMP C105 Stabilized Construction Access

- Purpose: Stabilized construction accesses are established to reduce the amount of sediment transported onto paved roads outside the project site by vehicles or equipment. This is done by constructing a stabilized pad of quarry spalls at entrances and exits for project sites.

- Conditions of Use: Construction accesses shall be stabilized wherever traffic will be entering or leaving a construction site if paved roads or other paved areas are within 1,000 feet of the site.

  Design Criteria: Construct stabilized construction accesses with a 12-inch thick pad of 4-inch to 8-inch quarry spalls, a 4-inch course of asphalt treated base (ATB), or use existing pavement. Do not use crushed concrete, cement, or calcium chloride for construction access stabilization because these products raise pH levels in stormwater and concrete discharge to waters of the State is prohibited. A separation geotextile shall be placed under the spalls to prevent fine sediment from pumping up into the rock pad

- Maintenance Standards: Quarry spalls shall be added if the pad is no longer in accordance with the specifications. Monitor pavement for tracked sediment and remove by shoveling or high-efficiency street sweeping.

BMP C106: Wheel Wash

- Purpose: Wheel washes reduce the amount of sediment transported onto paved roads by washing dirt from the wheels of motor vehicles prior to the motor vehicles leaving the construction site.

- Conditions of Use: Use a wheel wash only when stabilized construction access is not preventing sediment from being tracked off site. Note that wheel wash water is not stormwater; it is process water and must be discharged to a separate on-site treatment system or to the local sanitary sewer, with local sewer district approval.

- Design Criteria: Suggested details per Figure II-3.2, per the 2019 SWMMWW and included in the plan set for this project. Use a low clearance truck to test the wheel wash set up, as applicable.

- Maintenance Standards: Start each day with fresh water

2.2.3 Element #3 Control Flow Rates

Straw wattles or other energy dissipation structures shall be placed as necessary across the site and at the project bounds to ensure water does not build higher velocities. Care will be taken to prevent damage to storm drainage ditch located along the southern edge of the project site.

BMP C235 Wattles

- Purpose: Wattles are temporary erosion and sediment control barriers consisting of straw, compost, or other material that is wrapped in netting made of natural plant fiber or similar encasing material. They reduce the velocity and can spread the flow of rill and sheet runoff, and can capture and retain sediment.

- Conditions of Use: Wattles can be used in disturbed areas that require immediate erosion protection, on exposed soils during the period of short construction delays or over winter months, and on slopes requiring stabilization until permanent vegetation can be established.

- Design Criteria: Suggested details per Figure II-3.24, per the 2019 SWMMWW and included in the plan set for this project. Wattles shall be installed perpendicular to the flow and parallel to the slope contour.

- Maintenance Standards: Wattles may require maintenance to ensure they are in contact with soil and thoroughly entrenched, especially after significant rainfall on steep sandy soils. Inspect the slope after significant storms and repair any areas where wattles are not tightly abutted or water has scoured beneath the wattles.

2.2.4 Element #4 Install Sediment Controls

Sediment controls shall be installed and maintained to provide erosion control and minimize the discharge of pollutants off site.

BMP C233 Silt Fence

- Purpose: Silt fence reduces the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow

- Conditions of Use: Silt fence may be used downslope of all disturbed areas. Silt fence shall prevent sediment from going beneath, through, or over the top, but shall allow water to pass through the fence. It is not intended to treat concentrated flows, nor is it intended to treat substantial amounts of overland flow. Silt fences shall not be used in streams or V-shaped ditches.

- Design Criteria: Suggested details per Figure II:3.22 per the 2019 SWMMWW and included in the plan set of this project.

- Maintenance Standards: Repair any damage immediately. Intercept and convey all evident concentrated flow uphill of the silt fence to a sediment trapping BMP. Check the uphill side of the silt fence for signs of the fence clogging and acting as a barrier to flow and then causing channelization of flows parallel to the fence. If this occurs, replace the fence and remove the trapped sediment. Remove sediment deposits when the deposit reaches approximately one-third the height of the silt fence or install a second silt fence. Replace geotextile fabric that has deteriorated due to ultraviolet breakdown.

BMP C235 Wattles, see Section 2.2.3.

2.2.5 Element #5 Stabilize Soils

Any soils exposed and unworked for seven days during the dry season or two days during the wet season, will be temporarily stabilized by any of the following appropriate stabilization BMPs

BMP C120: Temporary and Permanent Seeding

- Purpose: seeding reduces erosion by stabilizing exposed soils. A well-established vegetative cover is one of the most effective methods of reducing erosion.

- Conditions of Use: Use seeding throughout the project on disturbed areas that have reached final grade or that will remain unworked for more than 30 days. Pay special attention to seeding needs prior to the end of optimum seeding windows.

- Design Criteria: Use applicable seeding mix per seeding use.

- Maintenance Standards: Areas which fail to establish 75 percent vegetation cover must be reseeded. When reseeding is ineffective, alternative methods should be used.

BMP C121: Mulching

- Purpose: Mulching soils provides immediate temporary protection from erosion. Mulch also enhances plant establishment by conserving moisture, holding fertilizer, seed, and topsoil in place, and moderating soil temperatures.

- Conditions of Use: Mulch should be used no more than 30 days on disturbed areas that require cover, and at all times for seeded areas.

- Design Criteria: Consult with local supplier or the local conservation district for their recommendations with respect to mulch materials, applications rates, and specifications.

- Maintenance Standards: The thickness of mulch cover shall be maintained. Areas that experience erosion shall be remulched or reevaluated for alternative erosion control measures.

BMP C123: Plastic Covering

- Purpose: Plastic covering provides immediate, short-term erosion protection to slopes and disturbed areas.

- Conditions of Use: Plastic sheeting may be used on disturbed areas that require cover measures for less than 30 days.

- Design Criteria: Plastic sheeting to be applied up and down slopes, with 8 inches of overlap at the seams. Seams to be taped when high winds are present.

- Maintenance Standards: Plastic sheets shall be checked regularly for tears, open seams, and deterioration due to ultraviolet light. Plastic will be replaced or repaired as necessary.

BMP C 140: Dust Control

- Purpose: Dust control prevents wind transport of dust from disturbed soil surfaces onto roadways, drainage ways, and surface waters.

- Conditions of Use: Use dust control in areas subject to surface and air movement of dust where on-site or off-site impacts to roadways, drainage ways, or surface waters are likely.

- Design Criteria: Vegetate or mulch areas without vehicle traffic. Clear only areas where immediate activity will take place. Construct windbreaks. Sprinkle the site with water to keep the surface wet or apply a dust palliative following the manufacturer's instructions. Use vacuum street sweepers. Keep speeds low when traveling on unpaved surfaces, add gravel and limit the amount of fines, use geotextiles, and encourage the use of alternative paved routes whenever possible. Limit dust causing work on windy days.

- Maintenance Standards: Respray and reroute construction site when necessary.

2.2.6 Element #6 Protect Slopes

Slopes within the project are less than 5 percent. No additional slope protection will be required.

2.2.7 Element #7 Protect Drain Inlets

All storm drain inlets will be protected for the duration of construction activity.

BMP C220: Storm Drain Inlet Protection

- Purpose: Inlet protection prevents coarse sediment from entering drainage systems prior to permanent stabilization of disturbed areas.
- Conditions of Use: Use inlet protection for all inlets which are operational before and during construction. Inlet protection may only be removed upon permanent stabilization of the disturbed area.
- Design Criteria: Catch basin filter details are included in the plan set of this project.
- Maintenance Standards: Inspect all forms on inlet protection frequently, especially after storm events. Clean and replace clogged catch basin filters. Avoid washing sediment into filters while cleaning.

2.2.8 Element #8 Stabilize Channels and Outlets

There are no on-site conveyance channels or outlets, no additional stabilization will be required.

2.2.9 Element #9 Control Pollutants

All pollutant sources shall be handled properly to minimize on-site spills and off-site discharge of pollutants.

BMP C151: Concrete Handling

- Purpose: concrete work can generate process water and slurry that contain fine particles and high pH, both of which can violate water quality standards in receiving waters. Use of precautions is necessary to minimize and eliminate concrete, concrete process water, and concrete slurry from entering waters of the State.
- Conditions of use: Any time concrete is used.
- Design Criteria: Wash concrete truck drums at approved off-site location or in designated areas only. Do not allow concrete wash water to drain to stormwater system or to enter an area of land designated for infiltration. Contain wash water and leftover product in a lined container when no designated washout areas are available and dispose of properly.
- Maintenance Standards: Check containers for holes in the liner daily during concrete pours and repair the same day.

BMP C153: Material Delivery, Storage, and Containment

- Purpose: Prevent, reduce, or eliminate the discharge of pollutants to the stormwater system or watercourses from material delivery and storage.

- Conditions of Use: Use at construction sites with delivery and storage of the following materials: petroleum products, soil stabilizers and binders, fertilizers and pesticides, detergents, asphalt and concrete compounds, hazardous chemicals (such as acids, lime, adhesives, paints, solvents, and curing compounds), and any other material determined to be potentially detrimental to the environment.

- Design Criteria: Minimize the storage of hazardous materials on-site, store materials in a designated area, and install secondary containment. Keep storage areas clean, organized and equipped with ample supply of appropriate spill kit clean-up materials including: water resistant nylon bags, small and large oil absorbent socks and pads, splash resistant goggles, nitrile gloves in a variety of sizes, disposable bags with ties, and instructions.

- Maintenance Standards: Secondary containment facilities shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be collected and placed into drums, which will be handled as hazardous waste unless testing determines them to be non-hazardous. Re-stock spill kit materials as necessary.

2.2.10 Element #10 Control Dewatering

Extensive dewatering is anticipated on the project site. Sediment laden or highly turbid waters will be filtered or settled before discharging.

2.2.11 Element #11 Maintain BMPs

All temporary and permanent Construction SWPPP BMPs will be maintained and repaired as needed to ensure continued performance of their intended function. Maintenance and repair shall be conducted in accordance with each particular BMP.

Visual monitoring of all BMPs installed at the site will be conducted at least once every calendar week and within 24 hours of any stormwater or non-stormwater discharge from the site. If the site becomes inactive and is temporarily stabilized, the inspection frequency may be reduced to once every calendar month.

All temporary erosion and sediment control (ESC) BMPs shall be removed within 30 days after the final site stabilization is achieved or after the temporary BMPs are no longer needed.

Trapped sediment shall be stabilized on site or removed. Disturbed soil resulting from removal of either BMPs or vegetation shall be permanently stabilized.

Protection must be provided for all BMPs installed for the permanent control of stormwater from sediment and compaction. BMPs that are to remain in place following completion of construction shall be examined and restored to full operating condition. If sediment enters these BMPs during construction, the sediment shall be removed and the facility shall be returned to conditions specified in the construction documents.

2.2.12 Element #12 Manage the Project

Projects will be best managed by the following principles:

- Projects will be phased to the maximum extent practicable and seasonal work limitations will be taken into account.
- Inspection and monitoring
    - Inspection and maintenance of BMPs per Element #11, Section 2.2.11
    - All project site inspections must be performed by a Certified Erosion and Sediment Control Lead (CESCL). The CESCL will be identified by the initiation of construction and will either be present or on call during all construction hours.
- Maintain an updated Construction SWPPP

BMP C160: Certified Erosion and Sediment Control Lead

BMP C162: Scheduling

- Purpose: sequencing a construction project reduces the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking.
- Conditions of Use: The construction sequence shall be an orderly listing of all major land-disturbing activities together with the necessary erosion and sedimentation control measures.
- Design Criteria: Minimize construction during rainy periods. Schedule projects to disturb only small portions of large projects at any one time. Complete grading as soon as possible and immediately stabilize the disturbed portion before disturbing the next area.

2.2.13 Element #13 Protect Low Impact Development BMPs

This project site does not employ any low impact development (LID) BMPs. No additional LID BMP protection is required.

Section 3

Construction Phasing and Schedule

The Contractor will prepare a construction schedule prior to commencing work.

Section 4

Financial and Ownership Responsibilities

This project is owned and operated by the City of Lacey.

Attachment 3

Soils Report

Geotechnical Engineering and Hydrogeological Services Draft Report

Lift Station #3 Replacement
Lacey, Washington

for
Murraysmith, Inc.

December 3, 2021

GeoEngineers

1101 South Fawcett Avenue, Suite 200
Tacoma, Washington 98402
253.383.4940

Geotechnical Engineering and Hydrogeological Services Draft Report

Lift Station #3 Replacement
Lacey, Washington

File No. 0353-021-00

December 3, 2021

Prepared for:

Murraysmith, Inc.
600 Union Street, Suite 300
Seattle, Washington 98101

Attention: Peter Cunningham, PE

Prepared by:

GeoEngineers, Inc.
1101 South Fawcett Avenue, Suite 200
Tacoma, Washington 98402
253.383.4940

Brett E. Larabee, PE
Senior Geotechnical Engineer

David S. Phelps, PE
Principal

Stephen Thomas LHG David S. Phelps, PE
Senior Principal Hydrogeologist

BEL:DSP:ST:leh

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LIST OF FIGURES

APPENDICES

1.0 INTRODUCTION AND PROJECT UNDERSTANDING

This report presents the results of GeoEngineers, Inc. (GeoEngineers) geotechnical engineering and hydrogeological services for the City of Lacey Lift Station #3 Replacement project (the project). The project site is located at 2404 Golf Club Road SE in Lacey, Washington. A vicinity map is provided as Figure 1. Our understanding of the project is based on our review of the project Request for Qualifications dated March 5, 2021, our communications with, and materials provided by Murraysmith, Inc. (Murraysmith) and our experience on similar projects in Lacey.

The existing lift station is located at the northeast corner of the Golf Club Road SE and 26th Avenue SE intersection. We understand that the City of Lacey has purchased the property adjacent to the lift station and plans to remove the existing single-family residence to construct the new lift station. The proposed new lift station will include a permanent precast concrete wet well structure. We understand that the base of the new lift station will be around 25 feet below existing site grade. Anticipated excavations dimension associated with the replacement work are expected to be around 20 feet by 20 feet. Temporary shoring and dewatering are expected to be necessary to facilitate excavation and construct the lift station.

2.0 PURPOSE AND SCOPE OF SERVICES

The purpose of our services is to characterize soil and groundwater conditions at the site as a basis for providing geotechnical engineering and hydrogeological conclusions, design recommendations and construction considerations related to the Lift Station #3 Replacement project. Our specific scope of services is included in our Task Order Agreement with Murraysmith dated April 30, 2021 which was executed on July 14, 2021.

3.0 SITE CONDITIONS

3.1. Literature Review

We reviewed the *Geologic Map of the Lacey 7.5-minute Quadrangle, Thurston County, Washington* (Logan, Walsh, Schasse, and Polenz 2003). The map indicates that the soils near the project consist of Latest Vashon recessional sand and minor silt (Qgos). Vashon till (Qgt), which regionally underlies the Qgos unit, is mapped at the surface east of the project site.

Recessional sand deposits are described in the literature (for example, Drost et al. 1999) as moderately well sorted, fine- to medium-grained sands and minor silt. These deposits are not glacially consolidated and are in a loose to medium dense condition. In this report, we refer to Latest Vashon recessional sand and minor silt deposit as “recessional outwash”. Groundwater in this unit is mostly unconfined and perched, and the soils have moderate to high permeability. Drost et al (1999) indicates the Qgos unit is between 25 and 50 feet thick in this area.

Vashon till is a highly compact mixture of clay, silt, sand, and gravel that was deposited below, and subsequently overridden by, glacial ice. The upper few feet of till deposits can be weathered and in a loose to dense condition. Underlying relatively undisturbed till is typically very dense with low permeability. Drost et al (1999) indicates the till unit is between 25 and 50 feet thick in this area.

3.2. Surface Conditions

The existing and future replacement Lift Station #3 is located in a residential neighborhood at the southwest corner of a residential parcel that was acquired to construct the replacement lift station. The residential parcel is developed with a one-story single-family home with a concrete driveway. A wood fence separates the residential area from the existing lift station. The project site is generally level. Surfacing around the pump station consists of crushed gravel. Chambers Lake is located about 400 feet south of the project site.

3.3. Subsurface Conditions

3.3.1. Subsurface Explorations and Laboratory Testing

We explored on-site subsurface conditions by advancing two borings (B-1 and B-2) at the approximate locations shown on the Site Plan, Figure 2. The borings were advanced to 51½ feet below ground surface (bgs) using track-mounted drilling equipment and drilling operators subcontracted to GeoEngineers. Monitoring wells were constructed in each boring after drilling was complete. Details of the exploration program and summary logs of the explorations are included in Appendix A. Ground surface elevations provided on the logs were determined using materials provided by Murraysmith and are referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29).

Soil samples obtained from the borings were taken to our geotechnical laboratory for further evaluation. Testing included moisture content determinations, percent fines determination and gradation analyses. A description of the laboratory test procedures and test results are presented in Appendix B.

3.3.2. Soil Conditions

The upper 3 to 6 inches of borings B-1 and B-2 encountered crushed rock surfacing material. Below the surficial material, we observed what we interpret to be three geologic units, fill, recessional outwash, and glacial till.

In boring B-1, we observed what we interpret to be fill extending to approximately 10 feet bgs. Fill consisted of very loose to loose silty sand with variable gravel content. Underlying the fill in boring B-1, we observed recessional outwash extending to approximately 34 feet bgs. The recessional outwash consisted primarily of loose to dense sand with silt and silty sand. The underlying glacial till consisted of medium dense to dense silt with sand and variable gravel content and dense silty sand with gravel. Boring B-1 was terminated within the glacial till unit at 51½ feet bgs.

In boring B-2, we observed fill extending to approximately 7 feet bgs. Below the fill we observed recessional outwash extending to approximately 33 feet bgs. The upper 18 feet of recessional outwash consisted primarily of medium stiff to stiff sandy silt and silt with occasional sand. The lower 8 feet of recessional outwash consisted primarily of medium dense to very dense sand with silt and interbedded lenses of sand and silty sand. Glacial till in boring B-2 consisted primarily of dense to very dense sand with silt and gravel, silty sand, gravel with silt and sand and silty gravel. Boring B-2 was terminated within the glacial till unit at 51½ feet bgs.

3.3.3. Groundwater Conditions

Our interpretation of groundwater conditions at the site is based on groundwater observations made during drilling and subsequent groundwater measurements taken in the two monitoring wells. We did not find details of other groundwater wells in the project area in public records for use in our characterization.

Borings B-1 and B-2 were completed as 2-inch-diameter monitoring wells. The well screens extend from 7 to 17 feet (well B-1) and 5 to 15 feet (well B-2). We developed both wells using a low-flow system to improve the hydraulic connection between the native formation and the well screen. On October 5, 2021, we installed Seametrics *Smart Sensor* pressure transducers with an integrated data logger in the wells to measure groundwater levels at regular intervals (hourly). We returned to the site on November 23 (49 days after drilling) to retrieve the pressure transducer data. Figure 3 shows the groundwater hydrographs for wells B-1 and B-2, and the daily precipitation for Olympia Airport, for this period. The highest groundwater recorded during the monitoring period was Elevation 196.3 feet on November 15, 2021. Groundwater levels rose by more than 3 feet during this period in response to the rainfall events.

We anticipate that groundwater levels at the site will fluctuate throughout the year. Based on our experience in the area we expect that groundwater levels will remain between 3 and 10 feet bgs (approximately Elevation 189 to 196 feet) year round. Groundwater is likely hydraulically connected to Chambers Lake, which has a mean level of Elevation 192.4 feet (1990-2012; Thurston County). Groundwater levels at the site will also likely fluctuate based on season and rainfall events.

3.3.3.1. Groundwater Analytical Testing

Groundwater samples were collected from each monitoring well and submitted to OnSite Environmental, Inc. of Redmond, Washington for analysis. Chemical analyses were performed on the groundwater samples to characterize the groundwater for discharge and handling considerations. The results of the analytical testing are included as Appendix C.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1. Summary

A summary of our primary geotechnical considerations is provided below. The summary is presented for introductory purposes and should be used in conjunction with the complete recommendations presented in this report.

- Based on the groundwater information collected to date and the planned depth of the wet well, we recommend assuming a groundwater level for the design of temporary shoring, permanent below-grade walls and structures of Elevation 196 feet (or 3 feet bgs).
- The excavation for the replacement lift station wet well will extend up to 20 feet below the seasonal high groundwater level of Elevation 196 feet. As a result, groundwater control (such as dewatering) will be required to construct these facilities in a safe and stable manner.
- The type of shoring and dewatering system and the system's configuration will depend on the final design depth of the excavation relative to the groundwater level at the time of excavation and on the contractor's preferences for completing excavation and construction of the below-grade portion of the structures.

Our specific geotechnical recommendations are presented in the following sections of this report.

4.2. Seismic Design Considerations

4.2.1. Seismic Design Parameters

We evaluated seismic site response using map-based methods described in the 2018 International Building Code (IBC). The 2018 IBC references the 2016 version of *Minimum Design Loads for Buildings and Other Structures* (American Society of Civil Engineers [ASCE] 7-16). Based on the results of our study, liquefiable soils (i.e., vulnerable to potential failure or collapse under seismic loading) are present within the upper 100 feet of the site. This means the site is categorized as Site Class F and that a site-specific seismic evaluation could be required to determine the seismic response. However, if the fundamental period of vibration of the planned structure is less than 0.5 seconds, the exception presented in Section 20.3 of ASCE 7-16 applies for determining the Site Class, and the values presented for Site Class D in the table below may be used. If the fundamental period of vibration of the planned structure is greater than 0.5 seconds, a site-specific seismic hazard evaluation could be required per IBC code.

TABLE 1. SEISMIC DESIGN CRITERIA

2018 IBC Parameters[1]	Value
Site Class	D
Mapped MCE_R Spectral Response Acceleration at Short Period, S_s (g)	1.38
Mapped MCE_R Spectral Response Acceleration at 1-second period, S_1 (g)	0.51
Site Modified Peak Ground Acceleration, PGA_M	0.65
Short Period Site Coefficient, F_a	1.0
Long Period Site Coefficient, F_v	1.79
Design Spectral Acceleration at 0.2-second period, S_{DS} (g)	0.92
Design Spectral Acceleration at 1.0-second period, S_{D1} (g)	0.61
T_S (S_{D1} / S_{DS}) (seconds)	0.66

Notes:

[1] Parameters developed based on latitude 47.7074411 and longitude -122.2847591 using the Applied Technology Council (ATC) Hazards online tool (https://hazards.atcouncil.org/).

4.2.2. Liquefaction

Liquefaction refers to the condition by which vibration or shaking of the ground, usually from earthquake forces, results in the development of excess pore pressures in saturated soils with subsequent loss of strength in the deposit of soil so affected. In general, soils that are susceptible to liquefaction include very loose to medium dense clean to silty sands and some silts that are below the water table.

We evaluated the liquefaction potential of site soils for the IBC design level earthquake (PGA=0.65, M=7.66) using simplified methods (Youd and Idriss 2001), which are based on comparing the cyclic resistance ratio (CRR) of a soil layer (the cyclic shear stress required to cause liquefaction) to the cyclic stress ratio (CSR) induced by an earthquake. The factor of safety (FS) against liquefaction is determined by dividing the CRR by the CSR.

Based on our analysis, there is a risk of liquefaction occulting within the recessional outwash deposits below the ground water table during the design earthquake event. Our calculations indicate the risk of liquefaction is greatest within 25 feet of existing site grades, and that liquefaction-related settlement on the order of 4 to 9 inches are possible following the design earthquake. We expect that differential liquefaction settlement over a distance of 100 feet could be on the order of 2 to 5 inches.

4.2.3. Lateral Spreading

Lateral spreading involves lateral displacement of large, surficial blocks of soil as the underlying soil layer liquefies. Although there is a potential for liquefaction it is our opinion that there is a low risk of lateral spreading because of the relatively flat site topography.

4.2.4. Down Drag Loads

We expect the proposed lift station permanent wet well structure and foundation will be separated from the surrounding liquefiable soils by compacted structural backfill placed between the temporary shoring and the permanent wet well structure. Due to the compacted soil buffer, we consider the risk of down drag loads of the permanent wet well structure to be low.

4.2.5. Surface Fault Rupture

According to the Washington State Department of Natural Resources (DNR) Interactive Natural Hazards Map (accessed December 1, 2021), traces of the Olympia Fault are mapped in the project vicinity. The location of the Olympia Fault is not well understood, and the actual location could be different than that shown on the interactive map. The fault does not appear to have any surface manifestations at the site and bedrock in the area is covered by a thick section of glacially consolidated sediments. Based on the lack of surface evidence of the fault, the uncertainty in the location of the fault, and that the fault is overlain by glacially consolidated soils, in our opinion there is a low risk of fault rupture occurring at the site.

4.3. Temporary Shoring and Dewatering

4.3.1. General

Construction of the proposed wet wells is expected to require excavations up to about 25 feet bgs. Due to site constraints, planned excavation depths and soil and groundwater conditions, we expect that completing the excavations as temporary cut slopes will not be feasible. Therefore, we anticipate that a combined shoring and temporary dewatering system will be needed to construct the proposed improvements. As shoring and dewatering systems are interdependent, their design should be coordinated.

Shoring systems and dewatering should consider potential impacts to adjacent structures and the environment. As such, their design should accommodate existing improvements, such as utilities, and existing lift station components. Shield type excavation systems, such as trench boxes, should not be used as shield systems are not designed to prevent movement of the sidewalls or excavation collapse, but rather to protect workers should collapse occur. This type of sidewall collapse or movement has the potential to damage surrounding infrastructure. We recommend that all shoring be designed to limit lateral deflections to no more than 2 inches. Tighter tolerances could be required adjacent to some lift station components.

The contractor should be responsible for selecting excavation and dewatering methods, monitoring the excavations for safety, and providing shoring to protect personnel and structures. We recommend that all shoring be designed to accommodate at least 2 feet of overexcavation of the subgrade. Excavations deeper than 4 feet should conform to the provisions of Title 296 Washington Administrative Code (WAC), Part N, “Excavation, Trenching and Shoring” if workers are required to enter. Shoring, trench boxes or sloped sidewalls will be required under Washington Industrial Safety and Health Act (WISHA). Excavation shoring should be designed by a qualified engineer in accordance with Washington State Department of Transportation (WSDOT) Standard Specification 2-09.3(3) D “Shoring and Cofferdams.” The dewatering

system should be designed and managed by a state-licensed hydrogeologist or civil engineer with experience with similar projects in these soil and groundwater conditions. We recommend that we be retained to review and comment on the proposed shoring and dewatering plan before construction.

We recommend that a baseline survey of surrounding structures and improvements be completed before dewatering and excavation begins to establish a record of the existing conditions. The survey should include establishing settlement benchmarks around the perimeter of the site and on critical or potentially settlement-sensitive nearby structures. We recommend a photo record of conditions of nearby improvements or structures be made before construction.

4.3.2. Temporary Shoring Approach

4.3.2.1. General

The sections below provide recommendations for two potential shoring approaches that, in our opinion, are practically and economically feasible for this site. Other temporary shoring systems could also be considered if proposed by the contractor/shoring designer. For the purposes of this report, we have limited our temporary shoring design recommendations to (1) sheet pile walls and (2) soldier pile and lagging walls without and with tiebacks.

4.3.2.2. Sheet Pile Shoring

Sheet piles walls can be constructed as cantilevered or braced systems. The need for a brace will depend on soil and water pressures, the type/size of sheet pile used, and the depth of sheet pile embedment below the base of the excavation. We expect that for a cantilever system, retaining saturated soil, sheet piles will need to be embedded at least twice the depth of the excavation to be stable. For a sheet pile system with a single brace located near the top of the excavation, we expect that the sheet pile embedment depths will be around half of that required for a cantilever system. Cantilever systems often require a stronger sheet pile section than braced systems as the sheet pile is required to resist the full soil load in bending.

If a second row of bracing is added, embedment depths could be reduced further. Bracing systems in a trench-type configuration span across the width of the excavation and may make it difficult to access some areas of the excavation. A sacrificial concrete tremie slab could be used as a brace at the base of the excavation. In addition to providing lateral resistance to the sheet piles it could also provide a relatively clean and stable base for construction.

Sheet piles will need to accommodate utilities that run perpendicular to the excavation area. If utilities are present below the base of the excavation, it might not be possible to install the sheet piles to the target embedment depth, this could produce isolated areas with limited groundwater cutoff and require additional bracing.

Based on the conditions observed in our explorations, we expect that consolidated glacial till exists a few feet below the base of the proposed excavation. Embedding the sheet piles into the glacial till could be difficult. Depending on the installation methods used, it may only be possible to install the piles 5 to 10 feet into the glacial till. We do not expect it will be possible to use conventional construction equipment, such as an excavator, to push the sheets into the glacial till. A vibratory pile hammer, or extractor/installer, will likely be needed to install the sheet piles. Impact hammers might not be allowed under current environmental permits. If greater embedment depths are needed in the design, pre-drilling into the glacial till could be required to loosen the soils. If this installation method is used, the effects of loosening the soils would need to be considered in the design of the shoring. Glacial till can contain lenses of coarse gravel, cobbles, and/or boulders. The contractor should be prepared for these conditions.

4.3.2.3. Soldier Pile Walls

We anticipate that a solider pile wall system could be feasible for this site. A dewatering system will likely need to lower the groundwater level before excavation to install wood lagging between the solider piles. Less dewatering could be required if the soldier pile lagging consists of steel sheets installed prior to excavation. This would, however, require the shoring to be designed for hydrostatic pressure.

Soldier piles walls are typically effective as cantilever systems with free face heights up to about 10 to 15 feet. For wall heights greater than about 15 feet, tieback anchors are typically required to help restrain the wall. Solider piles are typically spaced at about 5 to 10 feet on center. The spacing of soldier piles could be limited by existing utilities. Because the soldier piles do not create a continuous groundwater cutoff at the face or below the base of the excavation, groundwater will need to be actively managed with wells. Due to the lack of a below-grade groundwater cutoff, dewatering flow rates are expected to be greater than those for a sheet pile wall system.

Soldier piles are typically installed by either drilling a hole to the required depth, setting the pile and backfilling with concrete, or by driving the pile into the ground to the required depth. If the soldier piles are set in concrete, it may not be possible to remove the piles after the excavation is backfilled and the piles would need to be abandoned in place. If the piles are driven into place, it might be possible to remove the soldier piles after backfilling the excavation. We expect that soldier piles can be installed 5 to 10 feet into the underlying glacial till with a vibratory hammer. Greater embedment depths could require predrilling.

4.3.3. Temporary Shoring Design Parameters

4.3.3.1. General

The soil pressures against a shoring wall are dependent on the type of wall, the soil retained, the method of construction, and the extent of dewatering. The expected temporary shoring structures for the proposed lift station wet well excavation will need to resist only lateral earth pressures if dewatering is planned and lowers the groundwater below the wet well structure. If dewatering is not planned, temporary shoring structures for the proposed lift station excavation must resist lateral earth pressures and hydrostatic pressures.

4.3.3.2. Soil Properties for Design

For preliminary planning purposes, we recommend that loads against a shoring system be estimated using the soil properties in Table 2. These values are based on conditions observed in our explorations and our experience with shoring design in the project area. We have summarized the elevation range of the geologic units observed in our explorations. The provided range is approximate and relative locations and thicknesses of the geologic units are expected to vary across the excavation area. These parameters must be confirmed by the shoring design engineer and must also be confirmed in the field during construction.

TABLE 2. PRELIMINARY SOIL STRENGTH PARAMETERS

Geologic Unit	Friction Angle (degrees)	Total Unit Weight (pcf)	Elevation Range of Unit Observed in B-1 (ft)	Elevation Range of Unit Observed in B-2 (ft)
Fill	30	120	199 - 189	199 - 192
Recessional Outwash	30 - 32	125	189 - 165	192 - 166
Glacial Till	38	135	165 and below	166 and below

Shoring systems should be designed to withstand anticipated surcharge loads from construction equipment, traffic, soil stockpiles or other sources. Construction surcharge loads should be evaluated on a case-by-case basis. At a minimum, we recommend that a construction surcharged load equal to 200 pounds per square foot (psf) surface load be included in shoring design.

4.3.3.1. Solider Pile Design

We recommend that the embedded portion of the soldier piles be at least 2 feet in diameter and extend a minimum distance of 10 feet below the base of the excavation to resist "kick-out." The axial capacity of the soldier piles must resist the downward component of the anchor loads and other vertical loads, as appropriate. We recommend using an allowable end bearing value of 30 kips per square foot (ksf) for piles embedded into glacial till. The allowable end bearing value should be applied to the base area of the drilled hole into which the soldier pile is concreted. This value includes a factor of safety of about 2.5. The allowable end bearing value assumes that the shaft bottom is cleaned out immediately prior to concrete placement. If necessary, an allowable pile skin friction of 1.5 kips per square foot (ksf) may be used on the embedded portion of the soldier piles to resist the vertical loads. This value includes a factor of safety of about 2.

4.3.3.1. Lagging

We recommend that the temporary timber lagging be sized using the procedures outlined in the Federal Highway Administration's (FHWA) Geotechnical Engineering Circular No. 4. The site soils are best described as "difficult soils." Table 3 presents recommend lagging thicknesses (roughcut) as a function of soldier pile clear span and depth.

TABLE 3. RECOMMENDED LAGGING THICKNESS

Depth (feet)	Recommended Lagging Thickness (roughcut) for Clear Spans of:					
	5 feet	6 feet	7 feet	8 feet	9 feet	10 feet
0 to 25	3 inches	3 inches	3 inches	4 inches	4 inches	4 inches
25 to 50	3 inches	3 inches	4 inches	4 inches	5 inches	5 inches

Lagging should be installed promptly after excavation, especially in areas where perched groundwater is present or where clean sand and gravel soils are present and caving soil conditions are likely. The workmanship associated with lagging installation is important for maintaining the integrity of the excavation.

The space behind the lagging should be filled as soon as practicable. Placement of this material will help reduce the risk of voids developing behind the wall and damage to existing improvements located behind the wall.

Material used as backfill in voids located behind the lagging should be free of silt and clay particles, contain little sand and be relatively self-compacting such (e.g., pea-gravel or a clean angular ballast), and not cause buildup of hydrostatic pressure behind the wall. Lean concrete or controlled density fill (CDF) are also suitable options for use as backfill behind temporary walls. While lean concrete or CDF can reduce the volume of voids present behind the wall, based on our experience, the voids between each lift of lean concrete or CDF are sufficient for preventing the buildup of hydrostatic pressures behind the wall.

4.3.3.2. Tieback Anchors

If necessary, conventional or post-grouted tieback anchors may be used in conjunction with either sheet pile or soldier pile systems to resist lateral loads during the proposed lift station excavation. Lateral earth pressures for dewatered temporary shoring systems with one or multiple levels of tiebacks are presented in Figure 4. The pressure diagrams on Figure 4 assume that the excavation is dewatered to at least 2 feet below the planned bottom of excavation elevation. The allowable passive resistance presented on Figure 4 assumes that the embedded foundation elements extend into glacial till. We recommend a preliminary design load transfer value between the anchor and soil of 3 kips per lineal foot for anchors embedded into recessional outwash soils (based on 6- to 8-inch-diameter grouted anchors). The following are considerations for anchor installation:

- Positioning of the tieback system should be coordinated to miss existing or construction-related facilities, utilities and foundations.
- The anchor bond zone should be located beyond the assumed no-load zone as presented in Figure 4.
- Within the bond zone maintain a minimum center to center spacing of 5 feet between anchors.
- Lock each anchor off at the desired percentage of the allowable design load.

We recommend that tieback anchors be designed, constructed, and tested in accordance with the criteria presented in the current editions of the FHWA "Permanent Ground Anchors" and "Tiebacks" as well as Post Tensioning Institute "Recommendations for Prestressed Rock and Soil Anchors."

4.3.4. Temporary Dewatering

4.3.4.1. General

There are generally two ways to approach a combined shoring and dewatering system. The dewatering system can either be (a) open to the surrounding groundwater table or (b) localized to the excavation. In the case of an open dewatering system, the groundwater is drawn down over a large area and the shoring system retains primarily unsaturated soil. In the case of a localized dewatering system, the groundwater is only significantly lowered within the limits of the excavation and the shoring system must retain both the saturated soil and the hydrostatic pressure from the surrounding groundwater.

Localized dewatering systems require a relatively watertight shoring system (sheet piles) that extend below the base of the excavation to either fully or partially cutoff groundwater flow. By partially cutting off groundwater flow, most of inflow into the excavation is limited to the seepage that enters through the base of the excavation. A localized dewatering system creates an imbalance in the hydrostatic pressures inside to outside of the excavation and can result in "quick" or boiling sand conditions in the excavation base. This condition must be considered in the design. Methods to counteract this include: (1) extending the sheets further below the base of the excavation to reduce the groundwater gradient or (2) installing deeper dewatering wells in the interior of the excavation to relieve excess water pressure.

Heave of the excavation subgrade must also be considered in the combined system design. This condition is more prone to occur with braced sheet pile shoring in silt deposits but could also occur under other conditions as well. Heave may be more pronounced if a less permeable stratum is underlain by a more permeable stratum (e.g., silt or silty sand over sand) near the anticipated bottom of excavation, and the less permeable unit is relatively thin.

We recommend the contractor be responsible for designing and installing appropriate dewatering systems needed to complete the work. The contractor should anticipate obtaining discharge permits from municipal and/or regulatory agencies, if necessary.

4.3.4.2. Lift Station Wet Well

Temporary dewatering should be located around the perimeter of the lift station wet well excavation unless a fully impervious shoring system is used. Even with impervious shoring (e.g., sheet piles) to cut off lateral groundwater inflow to the excavations, additional measures may be required to control groundwater pressures at depth (below final structural subgrade) where higher groundwater pressures occur. Groundwater within and beneath the excavation may appear to be artesian in relation to the excavation subgrade, with the potential to cause basal instability, piping, boils, uplift, heave, and possible subgrade failure if not properly controlled by the contractor.

Considering the depth of the proposed lift station excavation, and the anticipated drawdown, we recommend managing groundwater inflow using large diameter dewatering wells for pervious temporary shoring systems. A dewatering well system should be installed in advance of the lift station excavation. We anticipate deep dewatering wells will need to extend up to 45 feet bgs around the proposed lift station excavation of 25 to 30 feet bgs. The wells should be screened from 5 feet bgs to the base of the completed well. The contractor's dewatering system designer should recommend the number, spacing, and final construction details (such as diameter, screen slot and filter pack sizes, and pumps) of the dewatering wells.

For impervious temporary shoring systems, such as driven interlocking sheet piles, deep dewatering wells may not be necessary if sufficient groundwater cut-off is provided. However, the use of a vacuum well point system within the lift station excavation may be desirable during and before completion of the excavation. Operation of a vacuum well point system may reduce groundwater pressures and limit inflow rates to provide drier conditions for construction after completion of the excavation.

If soldier pile and lagging is selected for temporary shoring, the temporary dewatering system should be designed to maintain the groundwater level at least 3 feet below the foundation subgrade elevation until the below-grade portion of the structure can withstand the hydrostatic pressures resulting in uplift on the bottom of the structural slab foundation and lateral pressures against below-grade walls.

Appendix E provides the results of our preliminary dewatering analysis. The analysis used two approaches: an analytical method based on the equations included in the dewatering text by Powers et al; and a numerical approached using the code MODFLOW-NWT. It should be noted that this is not a formal design, rather an assessment of possible options. The analysis considered a range of soil permeabilities based on our field and laboratory testing results (5 feet per day [ft/day] and 25 ft/day), excavation dimensions (20 feet by 20 feet or 50 feet by 50 feet in plan), and shoring (lateral cut-off) options, all lowering the groundwater level from Elevation 196 feet to Elevation 175 feet. The following summarizes the expected range of steady-state (equilibrium) dewatering rates for non-shored cases:

- 20 feet by 20 feet Excavation Option:
  - Low permeability: 40 to 60 gallons per minute (gpm)
  - High permeability: 200 to 280 gpm
- 50 feet by 50 feet Excavation Option:
  - Low permeability: 60 to 90 gpm
  - High permeability: 250 to 350 gpm

For the purposed of this analysis, we assumed the use of four wells evenly spaced outside the excavation, extending to a depth of 45 feet bgs.

Initial dewatering rates will be higher than those presented above; however, the rates will decline over time with continuous pumping as the drawdown is established and a cone of depression is centered on the excavation. As the cone of depression will extend from the construction site, hydraulic gradients reduce and flow rates decrease toward a steady-state flow rate.

The degree to which these rates would be lower due to inclusion of lateral shoring will depend on the depth and type of shoring (discussed in Section 4.3.2). If the shoring is relatively water-tight and extends to the base of the recessional aquifer (assumed to be at Elevation 145 feet in our analysis), prolonged dewatering rates will be minimal (less than 10 gpm) for the high permeability cases.

The contractor should anticipate that groundwater pumped from a dewatering system will need to be collected and treated to reduce sediment load, and turbidity, as well as to identify potential groundwater contaminants before being discharged.

Chambers Lake is approximately 400 feet south of the site and likely influences the groundwater levels in the surrounding areas. If groundwater at the site is connected to the lake water, dewatering volumes may continue to be high. The high end of our ranges above assumes a direct hydraulic connection exists. If no connection between the groundwater at the site and the lake is determined through periodic monthly monitoring of groundwater at the site monitoring wells, dewatering system inflows could be at the low end during the dry months of summer and fall.

4.3.4.3. Potential Adverse Impacts

Construction dewatering can create adverse impacts: these include problems caused by discharge; settlement of structures and utilities; and disturbance of contaminated groundwater. The potential for these adverse impacts at the project site is discussed in the following sections.

4.3.4.4. Problems Caused by Dewatering Discharge

Groundwater produced from dewatering operations usually requires disposal to a storm drain or sanitary sewer, contingent on availability at the site during the construction and on securing the required permits or permission from authorities. Permitted disposal volumes may be limited, with pipe size potentially causing concerns for lost conveyance capacity and the possibility of downstream choke points creating problematic backwater conditions. These limitations may control the design at the proposed lift station wet well location. Shoring might need to be designed to limit groundwater seepage to manageable quantities. High volumes of dewatering from the excavations at the lift station wet well may need to be returned directly to Chambers Lake, but sediment load and turbidity would require management, potentially through temporary storage in on-site tanks (Baker tanks or similar) with proper treatment prior to discharge directly to surface waters or indirectly via storm drains.

Arrangements to permit the proposed dewatering discharge must be made in advance with the City of Lacey (if using sewers), Washington State Department of Ecology (Ecology) (if discharging to surface waters directly or via storm drains) or other applicable agencies.

4.3.4.5. Settlement of Structures and Utilities

Lowering the groundwater table during dewatering operations increases the effective stress levels in soils at and below the existing groundwater table where it is lowered, which can result in problematic settlements of structures and utilities nearby where soft and compressible soils are present at or near the water table. Our preliminary dewater analysis indicates that, assuming no cut-off shoring and wells located outside the excavation, 10 feet of temporary drawdown could occur at distances of 50 to 100 feet from the site.

4.3.5. Monitoring of Shoring and Dewatering Systems

In accordance with WSDOT Standard Specification 2-09.3(3) D "Shoring and Cofferdams," the contractor should provide a shoring monitoring plan. The contractor should also monitor groundwater levels as they relate to the shoring system. Monitoring of groundwater levels is recommended at the lift station wet well excavation to assess the effectiveness of the dewatering system and ensure dewatering objectives are being met. Regarding dewatering monitoring:

- The existing monitoring wells (B-1 and B-2) should be preserved to the extent possible and incorporated into the monitoring plan.
- Additional monitoring wells should be installed to monitor drawdown in and around the excavations where groundwater drawdown is critical to the shoring design.
- We recommend observing the pumping rate of the temporary dewatering system over the course of construction to provide data for the assessment of dewatering system performance.

Pressure transducers should be installed in new monitoring wells, which allow direct measurement of the dewatering achieved. Data collected from the transducers should be analyzed together with the amount of groundwater being pumped to track the effectiveness of the dewatering and guard against potential instability or heave due to unrelieved hydrostatic pressures during construction.

4.4. Lift Station Design

4.4.1. Foundation Support

4.4.1.1. Bearing Surface Preparation

Subgrades that will support below-grade structures should be compacted in place to a firm and unyielding condition prior to construction of the structure. Excessive compaction effort on the subgrade, especially if the elevation of the subgrade is below the static groundwater level, should be avoided to limit subgrade disturbance. Where the groundwater is lowered below the base of excavations and where the subgrade soils are not saturated, the contractor may attempt to compact loose or otherwise yielding subgrade soils in place. In areas where the soil at the bottom of the excavation is wet, loose, or is otherwise unsuitable, we recommend that the existing soils be overexcavated and replaced with structural fill. The depth of overexcavation required should be determined by a representative from our firm at the time of construction. For planning purposed we recommend assuming that up 2 feet of overexcavation could be necessary to establish the bearing surface.

If groundwater can be controlled and removed from the excavation, we recommend that overexcavations be backfilled with either WSDOT Standard Specification 9-03.10 "Aggregate for Gravel Base," WSDOT Standard Specification 9-03.14(1) "Gravel Borrow," or WSDOT Standard Specification 9-03.9(1) "Ballast." If there is standing water on the subgrade, an angular fill material with few fines such as WSDOT Standard Specification 9-03.9(2) "Permeable Ballast" should be used. Permeable ballast has larger and more angular particles than these other materials and can be compacted more easily underwater by tamping the material in place with an excavator bucket.

This level of subgrade preparation is intended to amend loose soils to create a uniform bearing surface. It may not be adequate to repair subgrades softened or loosened by significant heaving or boiling from inadequate groundwater control. If heaving or boiling conditions occur, excess water pressures must be controlled before the subgrade is overexcavated or compacted.

Prepared bearing surfaces must be protected from disturbance during construction. Subgrades could be protected by placing a coarse crushed rock material over the prepared subgrade or by installing a working concrete slab ("rat slab"). For bearing surface protection applications, we recommend a minimum crushed rock thicknesses or 6 inches or a minim rat slab thickness of 4 inches.

4.4.1.2. Buoyancy Forces and Uplift Resistance

Permanent dewatering is not planned and as a result, the structural slab supporting the permanent wet well structure should be waterproofed and designed to resist hydrostatic/buoyancy pressures. The uplift force acting on the structural slab and permanent wet well structure can be estimated by multiplying the volume of the structure located below the design groundwater elevation, in cubic feet, by the unit weight of water, 62.4 pounds per cubic foot (pcf). The force would then be distributed evenly about the base of the structural slab. We assume that resistance to the uplift force will be provided by the weight of the permanent wet well structure foundation and compacted soil placed over the structural slab that protrudes out from the base of the permanent wet well structure. Figure 5 provides recommendations for calculating buoyancy forces and uplift resistance forces. Additional uplift resistance can be provided by shearing resistance between the permanent walls of the wet well structure, or the backfill around the wet well, and the surrounding native soils. The presence and magnitude of these forces is dependent on construction techniques and it is conservate to neglect these forces when evaluating uplift resistance. We can provide additional recommendations for calculating these forces, if requested.

4.4.1.3. Allowable Bearing Resistance

Deep subsurface structures such as the replacement wet well are anticipated to weigh less than the soil removed to install the structures. This results in a net reduction in vertical pressure on the subgrade. Significant settlement or differential settlement is only expected if subgrades are disturbed. We recommend that connections between structures and pipes be designed to account for at least ½ inch of differential settlement to account for disturbed subgrades.

Concentrated loads within the lift station excavation could induce localized bearing failures or differential settlement. Bearing pressures from concentrated loads (loads that are not distributed over the entire footprint of the structural slab) should be limited to 1,500 psf in order to limit differential settlement between components. This can be increased to 2,500 psf if the structural slab is loaded before settlement sensitive connections are made. These bearing pressures should be applied to the total of dead and long-term live loads and may be increased by one-third when considering total loads, including earthquake or other transient loads.

4.4.1.4. Lateral Resistance

Lateral foundation loads may be resisted by passive resistance on the sides of a structural slab and by friction on the base of the structural slab foundations. For structural slabs supported on native soils or on compacted structural fill, the allowable frictional resistance on the base of the structural slab may be computed using a coefficient of friction of 0.3 applied to vertical dead-load forces from the wet well structure and surrounding backfill placed over the structural slab within the temporary shoring.

The allowable passive resistance on the structural slab foundation poured directly against undisturbed soils may be computed using an equivalent fluid density of 250 pcf for undisturbed site soils located above the static groundwater table and 125 pcf for undisturbed site soils located below the groundwater table. If compacted structural fill is placed around the structural foundation, the allowable passive resistance may be increased to 280 pcf and 140 pcf for unsaturated and saturated conditions, respectively.

The above coefficient of friction and passive equivalent fluid density values incorporate a factor of safety of about 1.5.

4.4.1.5. Construction Considerations

We recommend that the condition of all subgrade areas be observed by GeoEngineers to evaluate whether the work is completed in accordance with our recommendations and whether the subsurface conditions are as anticipated. If loose or otherwise unsuitable areas are present at the structural slab subgrade elevation, the areas should be remediated as recommended in this report.

If deep dewatering wells are not used for dewatering and sufficient groundwater cutoff is not provided, we recommend installing the structural slab via a tremie pipe. Dewatering the excavation would reduce groundwater pressures and limit groundwater inflow rates to provide drier conditions for construction after completion of the excavation. The depth and thickness of the slab should be designed with full consideration of groundwater pressures acting on the base of the slab.

4.4.2. Permanent Below Grade Walls

Permanent wet well structure walls will need to resist both lateral earth pressures of the surrounding soil and hydrostatic pressures. We recommend that below grade walls be designed for full hydrostatic pressure below Elevation 196 feet (3 feet bgs).

The following lateral earth pressures should be used for design of below grade walls.

- Active soil pressure may be estimated using an equivalent fluid density of:
  - 40 pcf for the drained and level backfill condition
  - 82 pcf for the undrained and level backfill condition (this value includes hydrostatic pressures)
- At-rest soil pressure may be estimated using an equivalent fluid density of:
  - 60 pcf for the drained and level backfill condition
  - 91 pcf for the undrained and level backfill condition (this value includes hydrostatic pressures
- For seismic considerations, a uniform lateral pressure of 10H psf (where H is the height of the retaining structure or the depth of a structure below ground surface) should be added to the lateral earth pressure.
- Other surcharge loads should be included following the recommendations presented in Figure 6.

The active soil pressure condition assumes the wall is free to move laterally 0.001 H, where H is the wall height). The at-rest condition is applicable where walls are restrained from movement. The above-recommended lateral soil pressures do not include other surcharge loads than described or the effects of sloping backfill surfaces. We should be consulted if other surcharge loads are anticipated as this may change the lateral pressure values provided.

Over-compaction of fill placed directly behind below-grade structures must be avoided. We recommend use of hand-operated compaction equipment and maximum 6-inch loose lift thickness when compacting fill within about 5 feet of below-grade structures.

4.4.2.1. Drainage

We anticipate that a permanent drainage system will not be included behind the permanent below grade features. In lieu of a drainage system, we recommend that permanent below-grade structures be water-proofed to the ground surface, as necessary.

4.5. Foundation Support of Other Improvements

Other small structures associated with lift station improvements can be supported on conventional shallow foundations. We recommend that foundations for these structures be established at least 18 inches below grade and have a minimum dimension of 24 inches. Footings for these structures can bear directly on existing site soils provided the bearing surface is proof compacted to a uniformly firm and unyielding condition. If the bearing surface cannot be adequately compacted, we recommend that the unsuitable soils be removed up to a depth of 18 inches below the bottom of the footing and they be replaced with compacted structural fill. We recommend that these footings be founded as recommended above and be proportioned using an allowable soil bearing pressure of 2,000 psf. This is a net bearing pressure; the weight of the footing and overlying backfill can be ignored in calculating footing sizes. We estimate that settlements of footings will be less than 1 inch. The lateral resistance parameters provided previously can also be used for design of these structures.

4.6. Site Development and Earthwork

4.6.1. General

We anticipate that site development and earthwork will include clearing and stripping, excavating for the lift station, utilities, and other improvements, establishing subgrades for foundations and placing and compacting fill and backfill materials. We expect that site grading and earthwork can be accomplished with conventional earthmoving equipment. The following sections provide specific recommendations for site development and earthwork.

4.6.2. Clearing and Stripping

Stripping depths on the order of 2 to 3 inches should be expected to remove existing ravel surfacing and sod areas around the project site. During stripping activities, the primary root systems of shrubs and trees within the clearing limits should be completely removed. It may be possible to reuse the existing gravel surfacing material onsite provided it does not become mixed with underlying soils and the material meets the specifications for its intended use. Sod or organic rich soils stripped from the site must not be reused as fill or structural fill.

4.6.3. Erosion and Sedimentation Control

Erosion and sedimentation rates and quantities can be influenced by construction methods, slope length and gradient, amount of soil exposed and/or disturbed, soil type, construction sequencing and weather. Implementing an erosion and sedimentation control plan will reduce the project impact on erosion-prone areas. The plan should be designed in accordance with applicable city, county and/or state standards. The plan should incorporate basic planning principles, including:

- Scheduling grading and construction to reduce soil exposure;
- Re-vegetating or mulching denuded areas;
- Directing runoff away from exposed soils;
- Reducing the length and steepness of slopes with exposed soils;
- Decreasing runoff velocities;
- Preparing drainage ways and outlets to handle concentrated or increased runoff;
- Confining sediment to the project site;
- Inspecting and maintaining control measures frequently.

Some sloughing and raveling of exposed or disturbed soil on slopes should be expected. We recommend that disturbed soil be restored promptly so that surface runoff does not become channeled.

Temporary erosion protection should be used and maintained in areas with exposed or disturbed soils to help reduce erosion and reduce transport of sediment to adjacent areas and receiving waters. Permanent erosion protection should be provided by paving, structure construction or landscape planting.

Until the permanent erosion protection is established and the site is stabilized, site monitoring may be required by qualified personnel to evaluate the effectiveness of the erosion control measures and to repair and/or modify them as appropriate. Provisions for modifications to the erosion control system based on monitoring observations should be included in the erosion and sedimentation control plan.

4.6.4. Temporary Excavations

The contract documents should specify that the contractor is responsible for selecting excavation and dewatering methods, monitoring the excavations for safety and providing shoring, as required, to protect personnel and structures.

In general, temporary cut slopes at this site should be inclined no steeper than about 1½H to 1V (horizontal to vertical). This guideline assumes that all surface loads are kept at a minimum distance of at least the depth of the cut away from the top of the slope and that seepage is not present on the slope face. Flatter cut slopes will be necessary where seepage occurs or if surcharge loads are anticipated. Temporary covering with heavy plastic sheeting should be used to protect slopes during periods of wet weather.

4.6.5. Groundwater Handling Considerations

The contractor performing the work should be made responsible for collecting and controlling groundwater encountered in excavations or generated during dewatering activities. The contractor should be required to develop a Temporary Construction Dewatering Plan that should be reviewed and approved by the design team and if necessary, the City of Lacey.

The dewatering design should consider water discharge locations. We anticipate that discharging the collected groundwater into the City of Lacey stormwater drainage system will be the preferred disposal method. Discharge permits will likely require turbidity testing of the collected water. Systems that collect water from correctly designed and developed wells typically to produce lower turbid water than sumps or other near-surface collection systems. However, all wells produce some amount of turbid water, especially during early stages of operation. The contractor should anticipate employing settling basins or filtration systems on site if collected water is to be discharged to the stormwater system.

4.6.6. Surface Drainage

Surface water from roofs, driveways and landscape areas should be collected and controlled. Curbs or other appropriate measures such as sloping pavements, sidewalks and landscape areas should be used to direct surface flow away from permanent improvements, erosion sensitive areas and from behind retaining structures.

4.6.7. Subgrade Preparation

Subgrades that will support structures and roadways should be thoroughly compacted to a uniformly firm and unyielding condition on completion of stripping and before placing structural fill. We recommend that subgrades for structures and roadways be evaluated, as appropriate, to identify areas of yielding or soft soil. Probing with a steel probe rod or proof-rolling with a heavy piece of wheeled construction equipment are appropriate methods of evaluation.

If soft or otherwise unsuitable subgrade areas are revealed during evaluation that cannot be compacted to a stable and uniformly firm condition, we recommend that: (1) the unsuitable soils be scarified (e.g., with a ripper or farmer's disc), aerated and recompacted, if practical; or (2) the unsuitable soils be removed and replaced with compacted structural fill, as needed.

4.6.8. Subgrade Protection and Wet Weather Considerations

Most of the soils encountered in our exploration contain a significant quantity of fines and will be susceptible to disturbance during periods of wet weather. Soil with high fines content is very sensitive to small changes in moisture and is susceptible to disturbance from construction traffic when wet or if earthwork is performed during wet weather. The wet weather season generally begins in October and continues through May in western Washington; however, periods of wet weather can occur during any month of the year. In our opinion, earthwork at the site should take place during the summer months or during periods of extended dry weather. If wet weather earthwork is unavoidable, we offer the following recommendations:

- The ground surface in and around the work area should be sloped so that surface water is directed away from the work area. The ground surface should be graded so that areas of ponded water do not develop. Measures should be taken by the contractor to prevent surface water from collecting in excavations and trenches. Measures should be implemented to remove surface water from the work area.
- Earthwork activities should not take place during periods of heavy precipitation.
- Slopes with exposed soils should be covered with plastic sheeting.
- The contractor should take necessary measures to prevent on-site soils and other soils to be used as fill from becoming wet or unstable. These measures may include the use of plastic sheeting, sumps with pumps and grading. The site soils should not be left uncompacted and exposed to moisture. Sealing exposed soils by rolling with a smooth-drum roller prior to periods of precipitation will help reduce the extent to which these soils become wet or unstable.
- Construction traffic should be restricted to specific areas of the site, preferably areas that are surfaced with working pad materials not susceptible to wet weather disturbance.

- Construction activities should be scheduled so that the length of time that soils are left exposed to moisture is reduced to the extent practical.
- Protective surfacing such as placing asphalt-treated base (ATB) or haul roads made of quarry spalls or a layer of free-draining material such as well-graded pit-run sand and gravel may be necessary to limit disturbance to completed areas.

4.7. Fill Materials

4.7.1. Structural Fill

The workability of material for use as structural fill will depend on the gradation and moisture content of the soil. We recommend that washed crushed rock or select granular fill, as described below, be used for structural fill during the rainy season. If prolonged dry weather prevails during the earthwork phase of construction, materials with a somewhat higher fines content may be acceptable. Weather and site conditions should be considered when determining the type of import fill materials purchased and brought to the site for use as structural fill.

Material used for structural fill should be free of debris, organic contaminants, and rock fragments larger than 6 inches. For most applications, we recommend that structural fill material consist of material similar to "Select Borrow" or "Gravel Borrow" as described in Section 9-03.14 of the WSDOT Standard Specifications.

4.7.2. Select Granular Fill

Select granular fill should consist of well-graded sand and gravel or crushed rock with a maximum particle size of 6 inches and less than 5 percent fines by weight based on the minus ¾-inch fraction. Organic matter, debris or other deleterious material should not be present. In our opinion, material with gradation characteristics similar to WSDOT Specification 9-03.9 (Aggregates for Ballast and Crushed Surfacing), or 9-03.14 (Borrow) is suitable for use as select granular fill, provided that the fines content is less than 5 percent (based on the minus ¾-inch fraction) and the maximum particle size is 6 inches.

4.7.3. Pipe Bedding

Trench backfill for the bedding and pipe zone should consist of well-graded granular material similar to "gravel backfill for pipe zone bedding" described in Section 9-03.12(3) of the WSDOT Standard Specifications. The material must be free of roots, debris, organic matter, and other deleterious material. Other materials may be appropriate depending on manufacturer specifications and/or local jurisdiction requirements.

4.7.4. Trench Backfill

Trench backfill must be free of debris, organic matter, and rock fragments larger than 6 inches. We recommend that trench backfill material consist of material similar to "Select Borrow" or "Gravel Borrow" as described in Section 9-03.14 of the WSDOT Standard Specifications. Where excavations occur in the wet, alternative materials such as select granular fill should be considered.

4.7.5. On-Site Soil

In our opinion, the existing fill and recessional outwash soils can be used as structural fill, provided that they can be adequately moisture conditioned, placed and compacted as recommended and do not contain

organic or other deleterious material. Based on our experience the sand with silt and silty sand outwash soils present at the site can be moisture sensitive and will be difficult to properly compact when wet. If earthwork occurs during a typical wet season, or if the soils are persistently wet and cannot be dried back due to prevailing wet weather conditions we recommend the use of imported structural fill or select granular fill, as described above.

We expect that soils generated from below the static groundwater level, even if dewatering is completed, will be generated at a moisture content above what is optimum for compaction. In order to reuse these soils, it will likely be necessary to dry the soils out before they can be re-used. This typically requires a large area where the soils and be spread and tilled and prolonged dry weather conditions. If it is not feasible to moisture condition existing soils, or if earthwork is planned to take place during the wet weather months, we recommend that the project budget include a contingency for using imported material as fill and structural fill.

4.8. Fill Placement and Compaction

4.8.1. General

To obtain proper compaction, fill soil should be compacted near optimum moisture content and in uniform horizontal lifts. Lift thickness and compaction procedures will depend on the moisture content and gradation characteristics of the soil and the type of equipment used. The maximum allowable moisture content varies with the soil gradation and should be evaluated during construction. Generally, 8- to 12-inch loose lifts are appropriate for steel-drum vibratory roller compaction equipment. Compaction should be achieved by mechanical means. During fill and backfill placement, sufficient testing of in-place density should be conducted to check that adequate compaction is being achieved.

4.8.2. Area Fills and Pavement Bases

Fill placed to raise site grades and materials under pavements and structural areas should be placed on subgrades prepared as previously recommended. Fill material placed below structures and footings should be compacted to at least 95 percent of the theoretical maximum dry density (MDD) per ASTM International (ASTM) D 1557. Fill material placed less than 2 feet below pavement sections should be compacted to at least 95 percent of the MDD. Fill placed deeper than 2 feet below pavement sections should be compacted to at least 90 percent of the MDD. Fill material placed in landscaping areas should be compacted to a firm condition that will support construction equipment, as necessary, typically around 85 to 90 percent of the MDD.

4.8.3. Backfill Behind Below-Grade Structures

Backfill behind retaining walls or below-grade structures should be compacted to between 90 and 92 percent of the MDD. Overcompaction of fill placed directly behind below-grade structures should be avoided to limit pressures on the wall. We recommend use of hand-operated compaction equipment and maximum 6-inch loose lift thickness when compacting fill within about 5 feet behind below-grade structures.

4.8.4. Trench Backfill

For utility excavations, we recommend that the initial lift of fill over the pipe be thick enough to reduce the potential for damage during compaction but generally should not be greater than about 18 inches. In addition, rock fragments greater than about 1 inch in maximum dimension should be excluded from this lift.

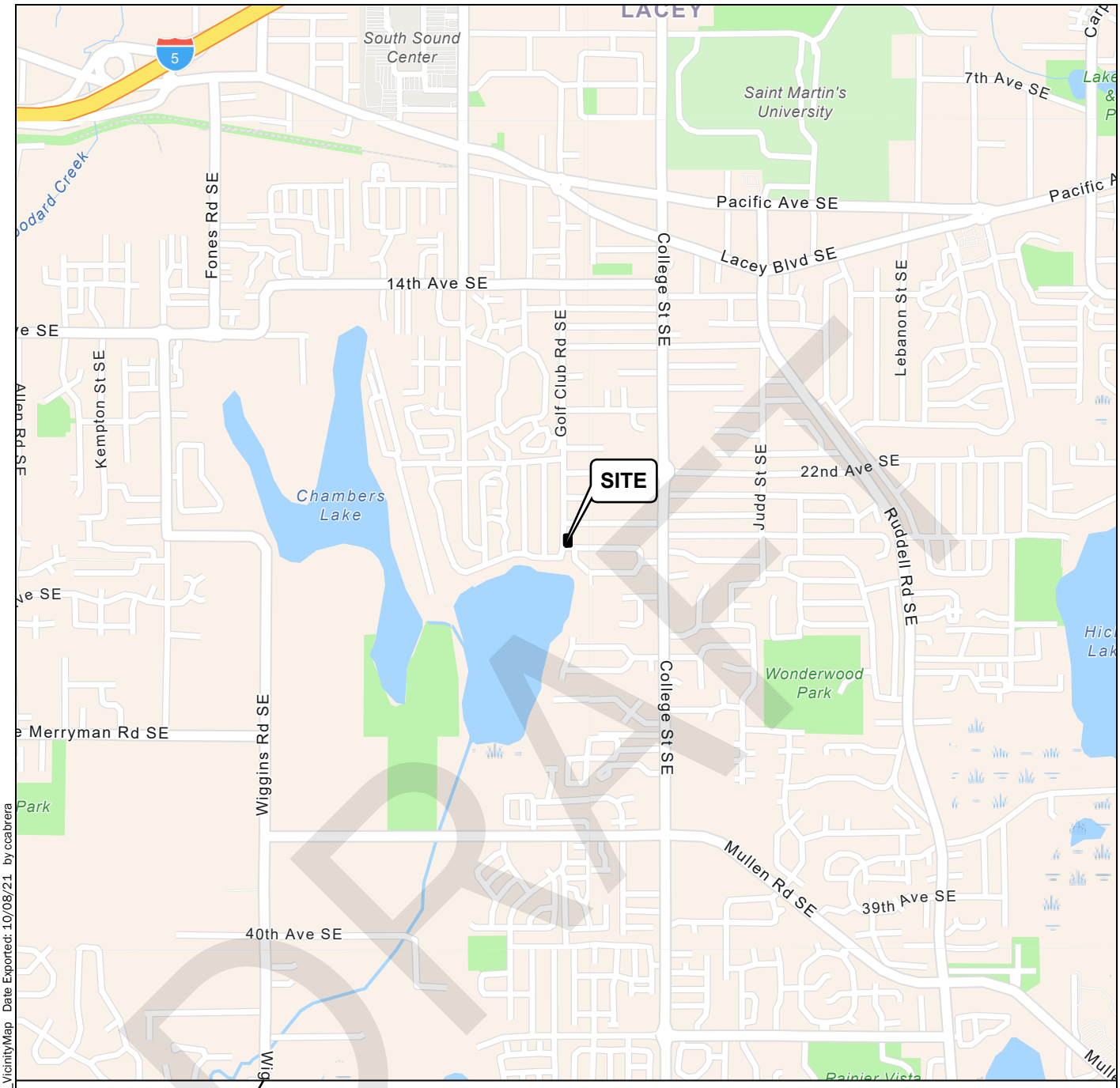
Trench backfill material placed below structures and footings should be compacted to at least 95 percent of the MDD. In paved areas, trench backfill should be uniformly compacted in horizontal lifts to at least 95 percent of the MDD in the upper 2 feet below subgrade. Fill placed below a depth of 2 feet from subgrade in paved areas must be compacted to at least 90 percent of the MDD. In non-structural areas, trench backfill should be compacted to a firm condition that will support construction equipment as necessary.

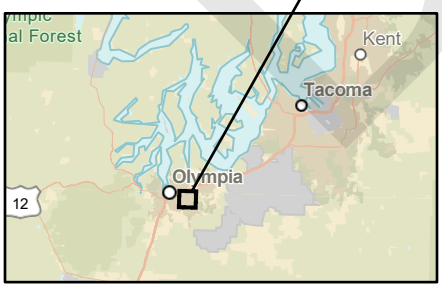
5.0 LIMITATIONS

We have prepared this report for the exclusive use of Murraysmith, Inc. and their authorized agents for the Lift Station #3 Replacement Project in Lacey, Washington.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix F titled “Report Limitations and Guidelines for Use” for additional information pertaining to use of this report.





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Feet

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: ESRI

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

City of Lacey – Lift Station 3 Replacement
Lacey, Washington

GeoEngineers

Figure 1

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Legend

Boring by GeoEngineers, 2021

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Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Bing Imagery

Projection: NAD 1983 StatePlane Washington South FIPS 4602 Feet

Site Plan

City of Lacey – Lift Station 3 Replacement
Lacey, Washington

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Figure 2

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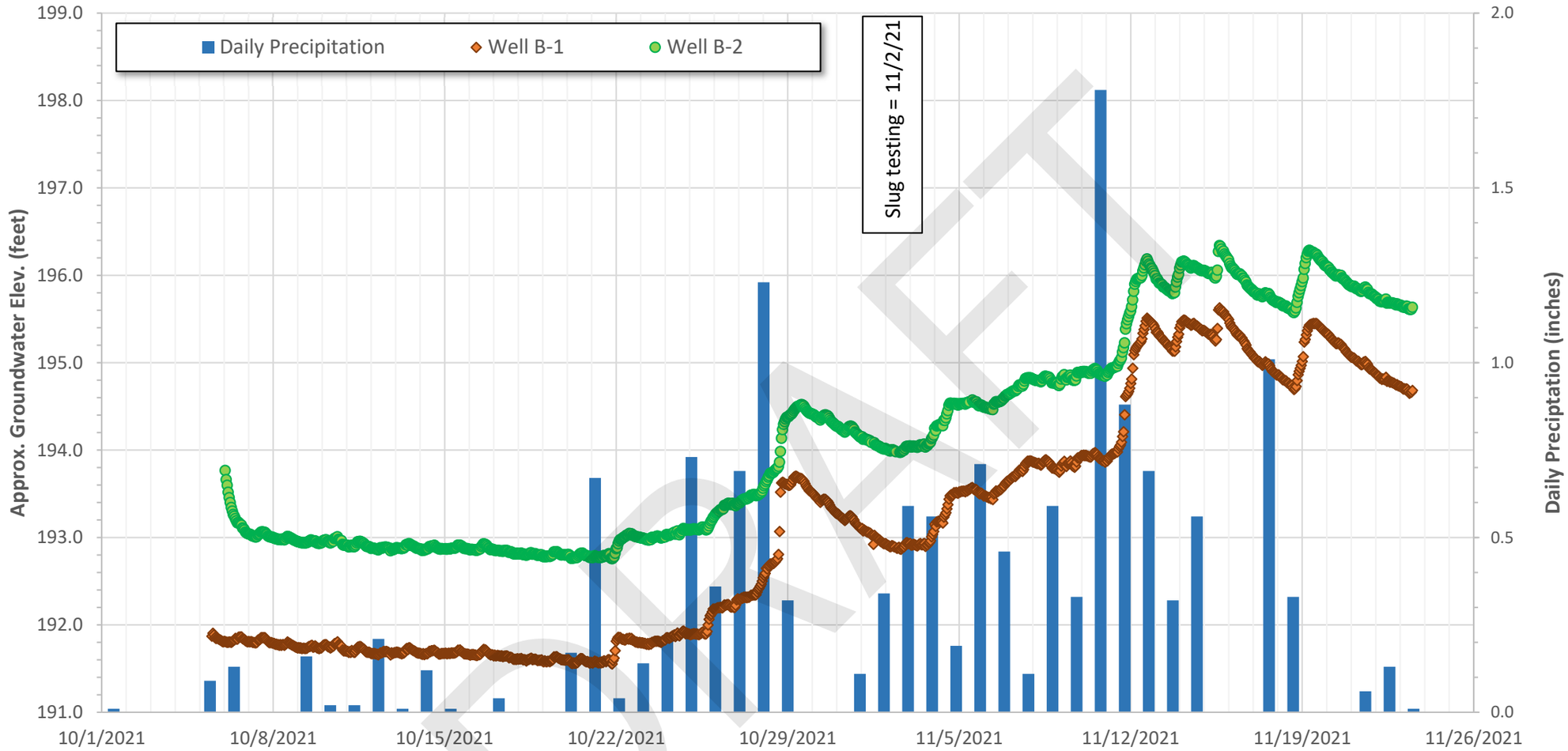

Notes:
1. Approx. ground surface = Elev. 199 ft (NGVD29)
2. B-1: well screen = 7-17 ft bgs
3. B-2: well screen = 5-15 ft bgs

Groundwater Level Hydrographs – Wells B-1 and B-2

City of Lacey – Lift Station 3 Replacement
Lacey, Washington

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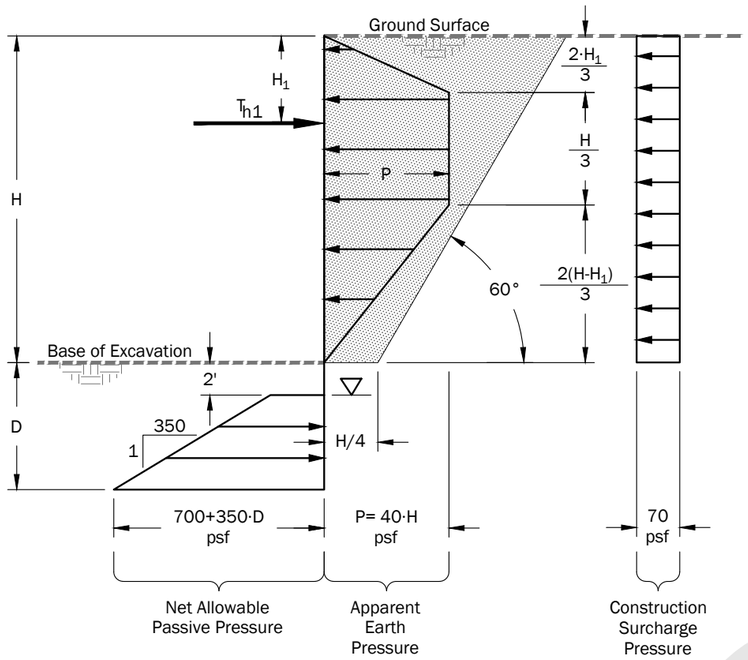
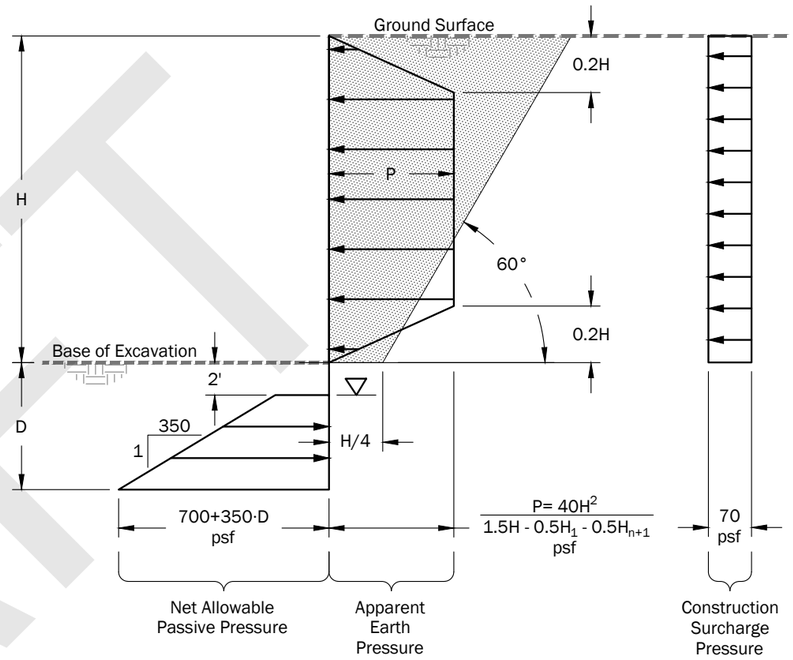
Figure 3

00353-021-00: 11/22/21

Conventional Soldier Pile Wall with One Level of Tiebacks



Conventional Soldier Pile Wall with Multiple Levels of Tiebacks



Notes:

1. Active/apparent earth pressure and construction surcharge pressure act over the pile spacing above the base of the excavation.
2. Passive earth pressure acts over 2.5 times the concreted diameter of the soldier pile, or the pile spacing, whichever is less.
3. Passive pressure includes a factor of safety of 1.5
4. Earth pressure diagrams assume that groundwater is lowered to at least 2 feet below base of excavation.
5. This pressure diagram is appropriate for temporary soldier pile and tieback walls. If additional surcharge loading (such as from soil stockpiles, excavators, dumptrucks, cranes, or concrete trucks) is anticipated, GeoEngineers should be consulted to provide revised surcharge pressures.

Legend

- No Load Zone
- H = Height of Excavation, Feet
- D = Soldier Pile Embedment Depth, Feet
- H_1 = Distance From Ground Surface to Uppermost Tieback, Feet
- T_{h1} = Horizontal Load in Uppermost Ground Anchor
- P = Maximum Apparent Earth Pressure, Pounds per Square Foot
- ▽ Design Groundwater Elevation for Drained Walls/ Passive Resistance Design

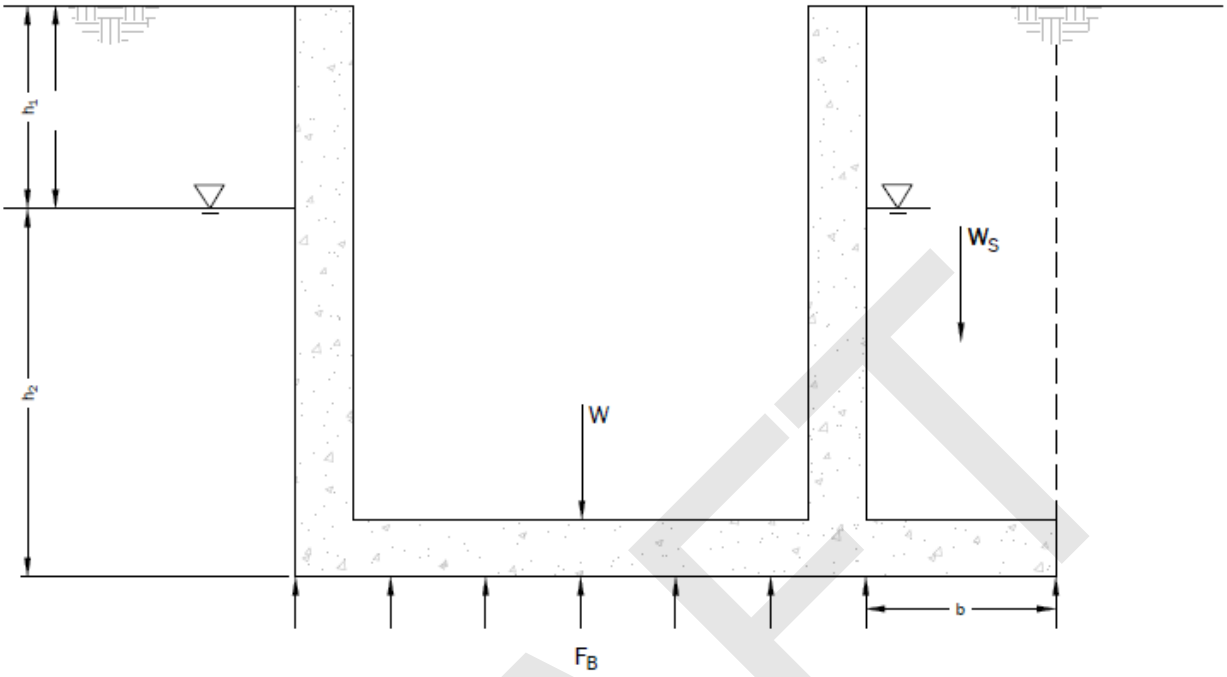
Not To Scale

Earth Pressure Diagrams - Temporary Soldier Pile & Tieback Wall

City of Lacey - Lift Station 3 Replacement
Lacey, Washington

GeoEngineers

Figure 4



ASSUMED SOIL PARAMETERS

Total Soil Unit Weight,	γ_T	= 125pcf
Bouyant Soil Unit Weight,	γ_b	= 63pcf
Soil Friction Angle,	Ø	= 32°

FACTORS OF SAFETY

$FS = \frac{W}{F_B}$

(for case where no protruding structure is present)

$FS = \frac{W + (W_S * P)}{F_B}$

(for case where protruding structure is present around perimeter of structure)

KEY TO SYMBOLS/FORCES

h_1 = Depth to groundwater (feet)

h_2 = Distance from groundwater table to base of structure (feet)

b = Width of structure covered with structural fill (feet)

W = Weight of structure (pounds)

W_S = Effective weight of structural fill directly above protruding structure
= $b\gamma_T h_1 + b\gamma_b h_2$ (in pounds per foot linear of wall)

P = Perimeter around base of structure (feet)

F_b = Bouyant force acting on structure (pounds)
= 62.4pcf* (volume of structure below groundwater table in cubic feet)

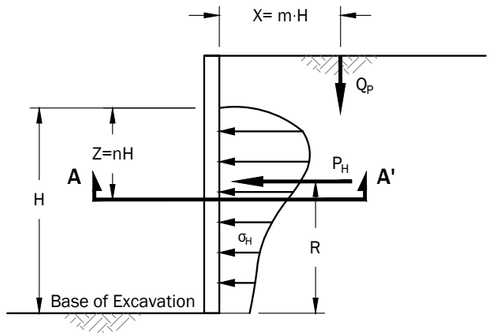
Buoyancy Forces and Uplift Resistance

City of Lacey – Lift Station 3 Replacement
Lacey, Washington

GeoEngineers

Figure 5

Lateral Earth Pressure from Point Load, Q_P (Spread Footing)



For $m \le 0.4$

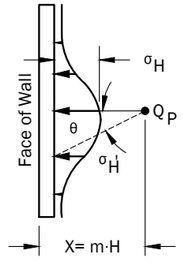
$$\sigma_H = \frac{0.33 Q_P n^2}{H^2(0.16+n^2)^3}$$

For $m > 0.4$

$$\sigma_H = \frac{1.77 Q_P m^2 n^2}{H^2(m^2+n^2)^3}$$

$$\sigma'_H = \sigma \cos^2(1.1\theta)$$

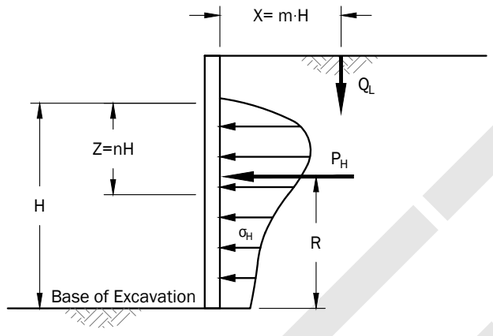
m	$P_H\left(\frac{H}{Q_P}\right)$	R
0.2	0.78	0.59H
0.4	0.78	0.59H
0.6	0.45	0.48H



Section A-A'

Pressures from Point Load Q_P

Lateral Earth Pressure from Line Load, Q_L (Continuous Wall Footing)



For $m \le 0.4$

$$\sigma_H = \frac{0.2n \cdot Q_L}{H(0.16+n^2)^2}$$

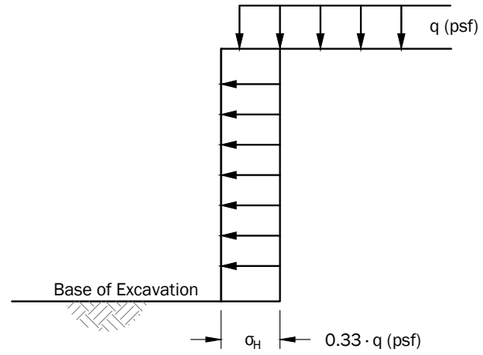
For $m > 0.4$

$$\sigma_H = \frac{1.28 m^2 n Q_L}{H(m^2+n^2)^2}$$

Resultant $P_H = \frac{0.64 Q_L}{(m^2+1)}$

m	R
0.1	0.60H
0.3	0.60H
0.5	0.56H
0.7	0.48H

Uniform Surcharges, q (Floor Loads, Large Foundation Elements or Traffic Loads)



σ_H = Lateral Surcharge Pressure from Uniform Surcharge

Notes:

1. Procedures for estimating surcharge pressures shown above are based on Manual 7.02 Naval Facilities Engineering Command, September 1986 (NAVFAC DM 7.02).
2. See report text for where surcharge pressures are appropriate.

Definitions:

- Q_P = Point load in pounds
- Q_L = Line load in pounds/foot
- H = Excavation height below footing, feet
- σ_H = Lateral earth pressure from surcharge, psf
- q = Surcharge pressure in psf
- θ = Radians
- σ'_H = Distribution of σ_H in plan view
- P_H = Resultant lateral force acting on wall, pounds
- R = Distance from base of excavation to resultant lateral force, feet
- X = Resultant lateral force acting on wall, pounds
- Z = Depth of σ_H to be evaluated below the bottom of Q_P or Q_L
- m = Ratio of X to H
- n = Ratio of Z to H

Not To Scale

Recommended Surcharge Pressure

City of Lacey - Lift Station 3 Replacement
Lacey, Washington

GeoEngineers

Figure 6

APPENDIX A
Subsurface Explorations

APPENDIX A
SUBSURFACE EXPLORATIONS

Soil conditions at the project site were explored by advancing two borings on October 5, 2021. The approximate locations of our explorations are shown on the Site Plan, Figure 2. Although the explorations were located in the field using a global positioning system (GPS) device, the locations shown on Figure 2 should be considered approximate. The elevations shown on the boring logs were determined using survey data provided by Murraysmith, Inc. and are referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29).

The borings were completed using track-mounted drilling equipment provided and operated by Holocene Drilling, Inc. under subcontract to GeoEngineers. Borings were advanced using hollow-stem auger and mud rotary drilling methods to 51½ feet below ground surface (bgs). The explorations were continuously monitored by a representative from our firm who examined and classified the soil encountered, obtained representative soil samples, and maintained a detailed log of the explorations. Soil encountered in the borings was classified in general accordance with ASTM International (ASTM) D 2488 and the classification chart listed in Key to Exploration Logs, Figure A-1. Logs of the borings are presented in Figures A-2 and A-3. The logs are based on interpretation of the field and indicate the depth at which we interpret subsurface materials or their characteristics to change, although these changes might actually be gradual.

Soil samples were obtained from the borings at approximate 2.5- to 5-foot-depth intervals using a 2-inch, outside-diameter, standard split-spoon sampler (Standard Penetration Test [SPT]) in general accordance with ASTM D 1586. The sampler was driven into the soil using a 140-pound automatic hammer, free-falling 30 inches. The number of blows required to drive the sampler each of three, 6-inch increments of penetration (total of 18 inches) were recorded in the field. The sum of the blow counts for the final 12 inches of penetration, unless otherwise noted, is reported on the boring logs.

The soil borings were backfilled by our drilling subcontractor following Washington Department of Ecology Guidelines. Soil cuttings generated during drilling were collected in drums and taken offsite by the driller for disposal. Both borings were finished as monitoring wells after drilling was completed. Flush surface mount monuments were constructed around the wells in accordance with Washington Department of Ecology Guidelines.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	SOD	Sod/Forest Duff
	TS	Topsoil

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata

Approximate contact between soil strata

Material Description Contact

Contact between geologic units

Contact between soil of the same geologic unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel

Standard Penetration Test (SPT)

Shelby tube

Piston

Direct-Push

Bulk or grab

Continuous Coring

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

"P" indicates sampler pushed using the weight of the drill rig.

"WOH" indicates sampler pushed using the weight of the hammer.

Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DD	Dry density
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
Mohs	Mohs hardness scale
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PL	Point load test
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

Key to Exploration Logs

GeoEngineers

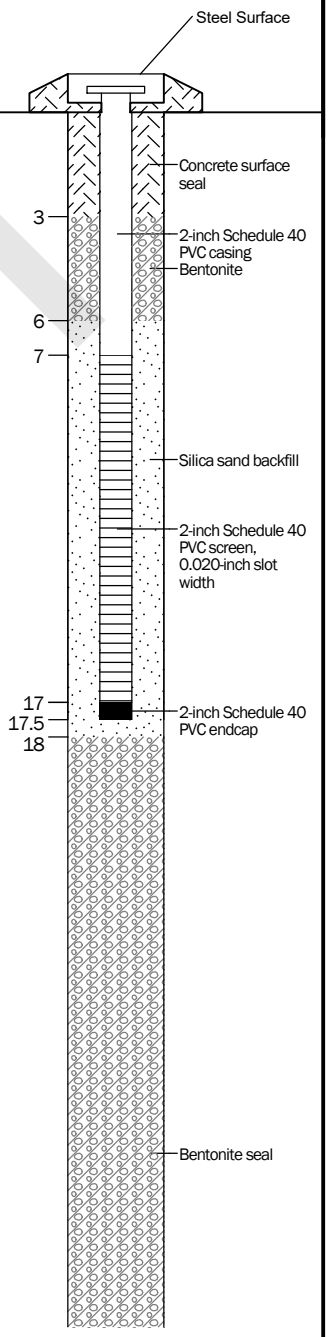
Figure A-1

Drilled: Start 10/5/2021 End 10/5/2021	Total Depth (ft) 51.5	Logged By CLJ Checked By BEL	Driller Holocene Drilling	Drilling Method Hollow-stem Auger	
Hammer Data: Autohammer 140 (lbs) / 30 (in) Drop		Drilling Equipment: Diedrich D50 Turbo (Track-mounted)		DOE Well I.D.: BNG 471 A 2-in well was installed on 10/5/2021 to a depth of 18 ft.	
Surface Elevation (ft) 199 Vertical Datum NGVD29		Top of Casing Elevation (ft)		Groundwater Date Measured: 11/23/2021	Depth to Water (ft): 4.70 Elevation (ft): 194.30
Easting (X) 1059835 Northing (Y) 625472		Horizontal Datum: WA State Plane South NAD83 (feet)			

Notes:

Depth (feet)	Elevation (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
0									GP	Approximately 3 inches of washed rock (fill)		
									SM	Dark brown silty fine to medium sand with gravel (very loose, moist) (fill)		
	195		8	3		1						
5			6	3		2				Occasional debris (plastic)		
			0	7						Becomes loose, wet		
	190											
10			16	10		3 SA			SM	Light brown and orange silty fine sand (medium dense, wet) (recessional outwash)	26	19
	185								SM	Brown silty fine sand (medium dense, wet)		
15			18	14		4 SA				'Water added to auger to control heave'	30	20
	180											
20			18	9		5				Becomes loose		
	175											
25			18	20		6 SA				Becomes medium dense	28	13
	170									Becomes gray, dense		
30			18	39		7						
	165								ML	Gray sandy silt (very stiff, wet) (glacial till)		
35												

WELL LOG



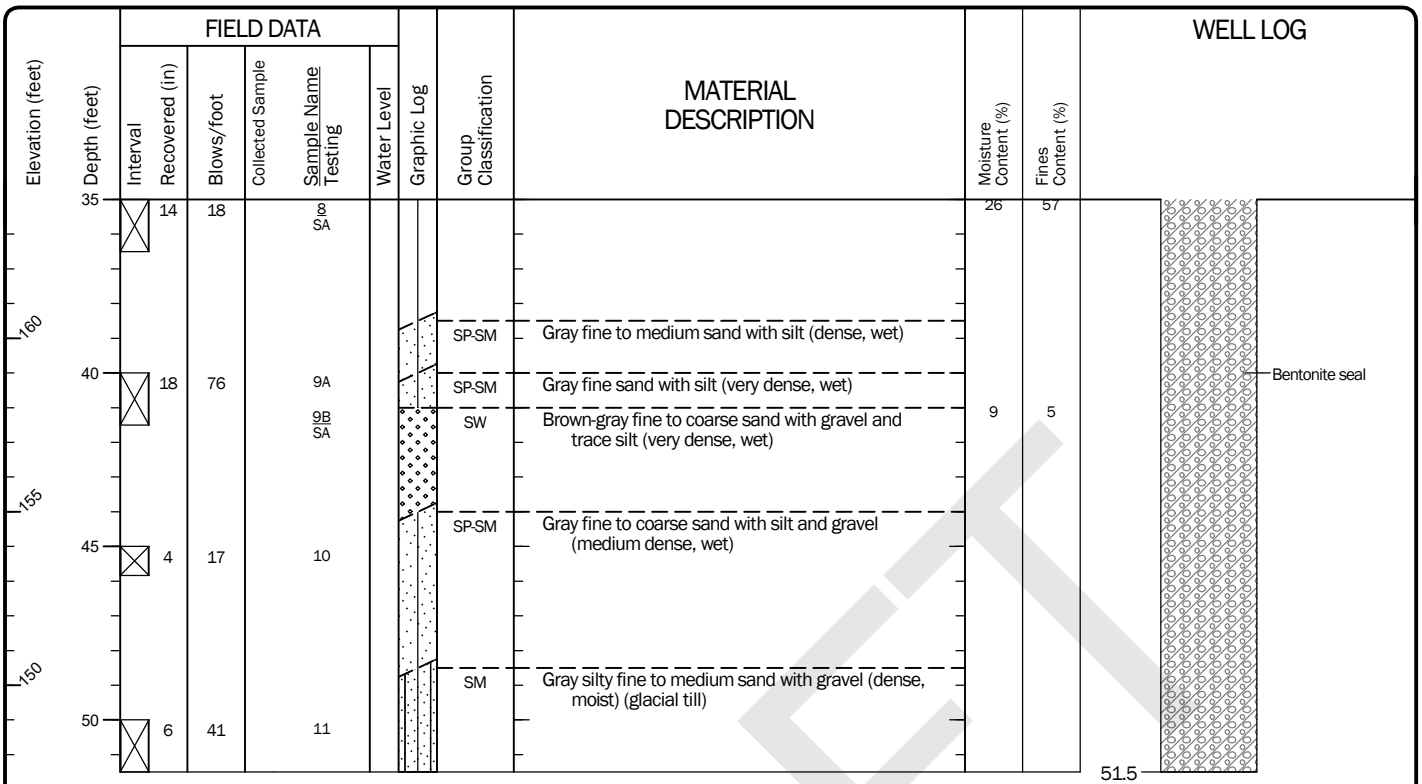
Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Boring with Monitoring Well B-1

GeoEngineers

Project: Lacey Lift Station 3 Replacement
Project Location: Lacey, Washington
Project Number: 00353-021-00

Figure A-2
Sheet 1 of 2



Log of Boring with Monitoring Well B-1 (continued)

GeoEngineers

Project: Lacey Lift Station 3 Replacement
Project Location: Lacey, Washington
Project Number: 00353-021-00

Figure A-2
Sheet 2 of 2

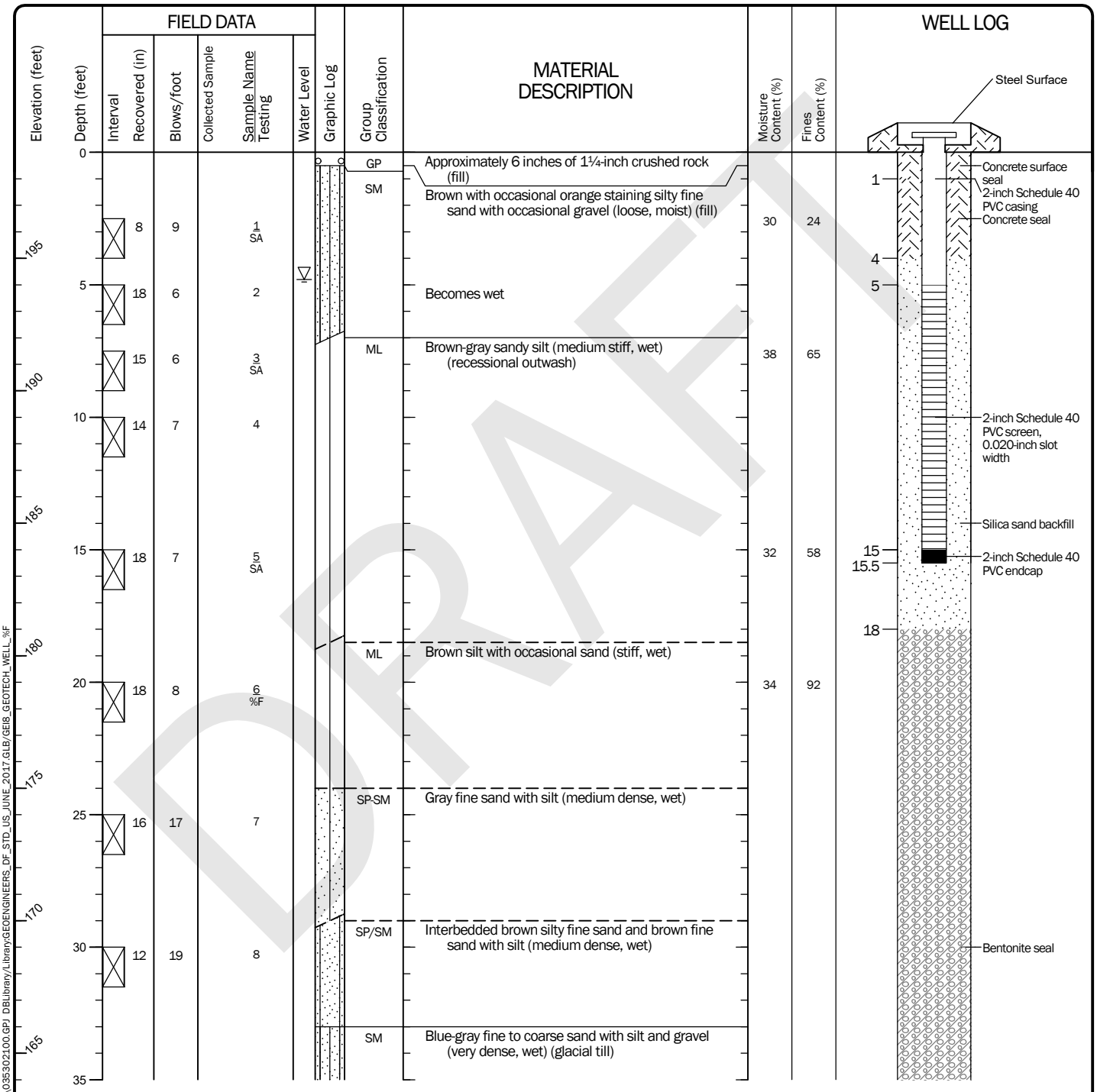
Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	10/5/2021	10/5/2021	51.5	CLJ	BEL	Holocene Drilling	Hollow-stem Auger

Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D50 Turbo (Track-mounted)
Surface Elevation (ft) Vertical Datum	199 NGVD29	Top of Casing Elevation (ft)	
Easting (X) Northing (Y)	1059812 625417	Horizontal Datum	WA State Plane South NAD83 (feet)

A 2-in well was installed on 10/5/2021 to a depth of 18 ft.

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
11/23/2021	4.80	194.20

Notes:



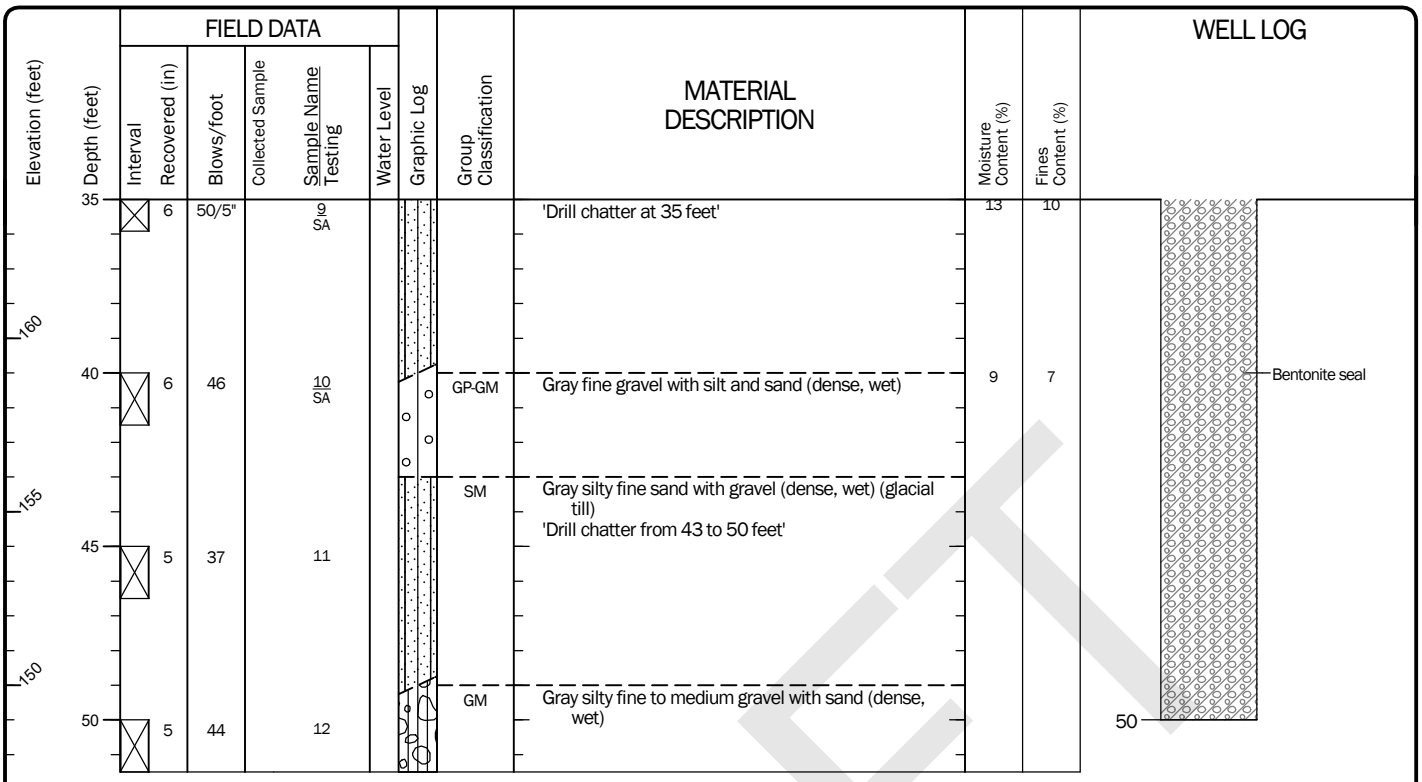
Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on USGS Topo. Vertical approximated based on USGS Topo.

Log of Boring with Monitoring Well B-2

GeoEngineers

Project: Lacey Lift Station 3 Replacement
Project Location: Lacey, Washington
Project Number: 00353-021-00

Figure A-3
Sheet 1 of 2



Log of Boring with Monitoring Well B-2 (continued)

GeoEngineers

Project: Lacey Lift Station 3 Replacement
Project Location: Lacey, Washington
Project Number: 00353-021-00

Figure A-3
Sheet 2 of 2

APPENDIX B
Laboratory Testing

APPENDIX B
LABORATORY TESTING

Soil samples obtained from the explorations were transported to our laboratory and examined to confirm or modify field classifications, as well as to evaluate engineering properties of the soil. Representative samples were selected for laboratory testing. The following paragraphs provide a description of the tests performed at our laboratory.

Grain-Size Analysis

Grain size (sieve) analyses were performed on selected soil samples in general accordance with ASTM International (ASTM) Test Method C 136. This test provides a quantitative determination of the distribution of particle sizes in soils. Figures B-1 through B-3 present the results of the grain-size analyses.

Percent Passing U.S. No. 200 Sieve (%F)

Selected samples were "washed" through the U.S. No. 200 sieve to estimate the relative percentages of coarse- and fine-grained particles in the soil. The percent passing value represents the percentage by weight of the sample finer than the U.S. No. 200 sieve (fines). The tests were conducted in general accordance with ASTM D 1140, and the results are shown on the exploration logs in Appendix A (Figures A-2 and A-3) at the respective sample depths.

Soil Permeability Estimation

We used empirical methods to estimate the bulk permeability of the unconsolidated soil samples based on the grain size results. The analysis was performed using the spreadsheet-based program HydroGeoSieveXL (Devlin 2015). Table B-1 presents the summary results.

TABLE B-1. BULK PERMEABILITY ESTIMATES FROM GRAIN-SIZE RESULTS

Boring/Sample Depth (ft)	USCS	No. Valid Estimates	Estimated Range	Geometric Mean	
			ft/d	*ft/d*	*cm/sec*
B-1 / 10.0*	SM	5	0.5 – 58.9	5.9	2.1×10^{-3}
B-1 / 15.0*	SM	5	0.6 – 58.1	6.0	2.1×10^{-3}
B-1 / 25.0	SM	5	4.0 – 70.5	14.9	5.3×10^{-3}
B-1 / 35.0	ML	5	<0.1 – 104	1.3	4.4×10^{-4}
B-1 / 41.0	SW	7	20.8 – 1,060**	106	3.8×10^{-2}
B-2 / 2.5	SM	5	0.4 – 60	4.1	1.4×10^{-3}
B-2 / 7.5*	ML	4	<0.1 – 109	0.4	1.5×10^{-4}
B-2 / 15.0*	ML	5	<0.1 – 102	1.3	4.4×10^{-4}
B-2 / 35.0	SP-SM	8	1.9 – 181	25.1	8.8×10^{-3}
B-2 / 40.0	GP-GM	7	6.5 – 4,400**	54.1	1.9×10^{-2}

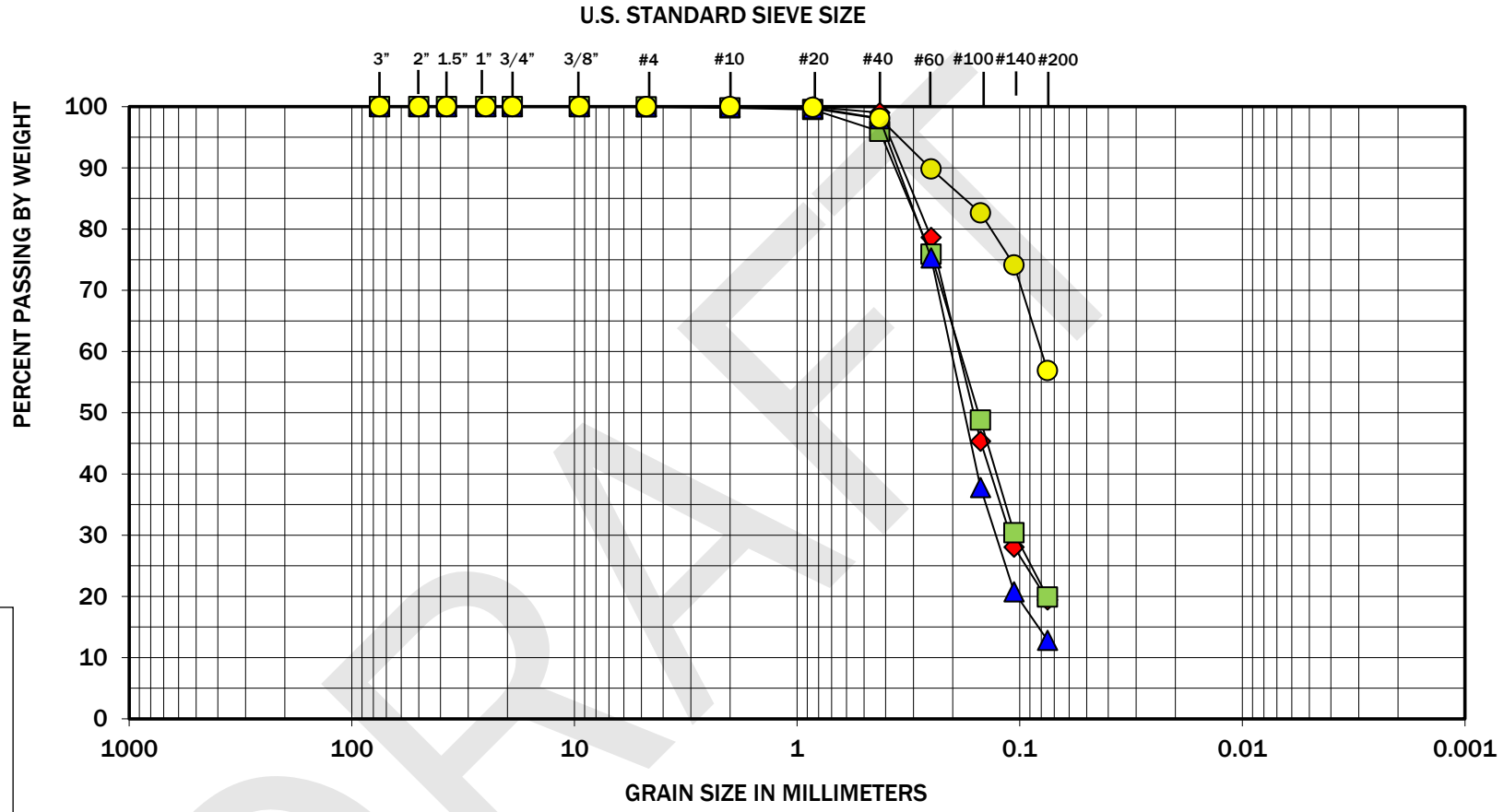
Notes:

*sample depth is adjacent to the well screen; ** anomalously high value, excluded from average calculations

cm/sec = centimeters per second; ft/d = feet per day; USCS = Unified Soil Classification System

The results indicate the following:

- The average bulk permeabilities for the ten samples range from 0.4 to 106 feet per day (ft/day) (1.4×10^{-4} to 3.8×10^{-2} centimeters per second [cm/sec]). The highest results were obtained from samples near the bottom of each boring (at 40 and 41 feet).
- Most of the estimates (middle quartiles) were within the range of 1.7 to 58 ft/day.
- For well B-1, the geometric mean bulk permeabilities for the two samples collected adjacent the wells screen (5.9 ft/day at 10 feet and 6.0 ft/day at 15 feet below the ground surface [bgs]) were lower than the average hydraulic conductivity calculated from the slug tests in that well (22.2 ft/day).
- For well B-2, the geometric mean bulk permeabilities for the two samples collected adjacent the wells screen (0.4 ft/day at 7.5 feet and 1.3 ft/day at 15 feet bgs) were similar to the average hydraulic conductivity calculated from the slug tests in that well (0.9 ft/day).



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring Number	Depth (feet)	Moisture (%)	Soil Description
◆	B-1	10	26	Silty sand (SM)
■	B-1	15	30	Silty sand (SM)
▲	B-1	25	28	Silty sand (SM)
●	B-1	35	26	Sandy silt (ML)

The grain size analysis results were obtained in general accordance with ASTM C 136. GeoEngineers 17425 NE Union Hill Road Ste 250, Redmond, WA 98052

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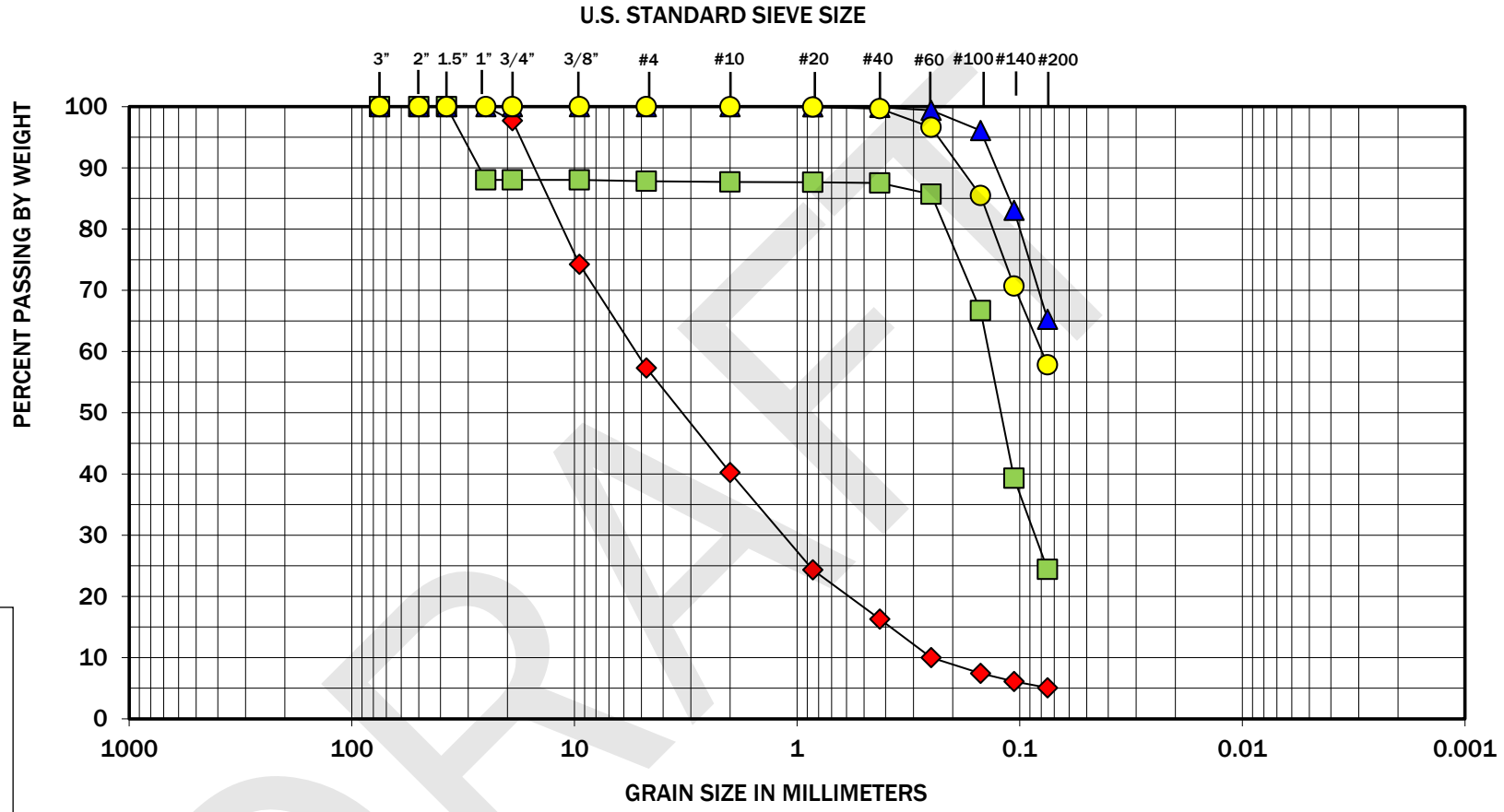
GEOENGINEERS

Figure-B-1

City of lacey- Lift Station 3 Replacement
Lacey, Washington

Sieve Analysis Results



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring Number	Depth (feet)	Moisture (%)	Soil Description
◆	B-1	41	9	Well-graded sand with gravel (SW)
■	B-2	2.5	30	Silty sand (SM)
▲	B-2	7.5	35	Sandy silt (ML)
●	B-2	15	32	Sandy silt (ML)

GeoEngineers

Figure-B-2

City of lacey- Lift Station 3 Replacement
Lacey, Washington

Sieve Analysis Results

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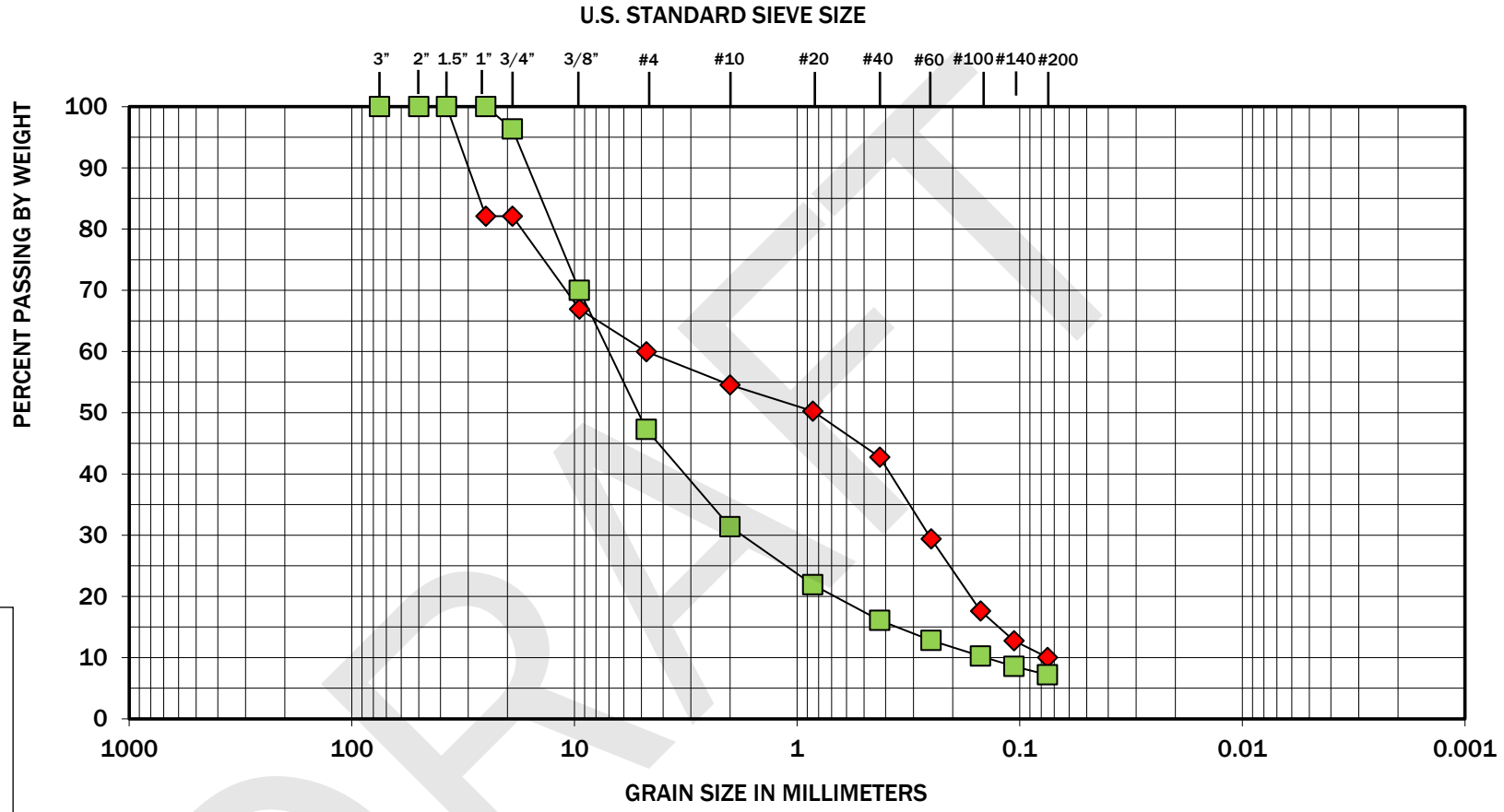
The grain size analysis results were obtained in general accordance with ASTM C 136. GeoEngineers 17425 NE Union Hill Road Ste 250, Redmond, WA 98052



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring Number	Depth (feet)	Moisture (%)	Soil Description
◆	B-2	35	13	Poorly-graded sand with silt and gravel (SP-SM)
■	B-2	40	9	Poorly-graded gravel with silt and sand (GP-GM)

Sieve Analysis Results

City of lacey- Lift Station 3 Replacement
Lacey, Washington

GeoEngineers

Figure-B-3

AASHTO ACCREDITED

The grain size analysis results were obtained in general accordance with ASTM C 136. GeoEngineers 17425 NE Union Hill Road Ste 250, Redmond, WA 98052

APPENDIX C
Groundwater Analytical Testing Results

OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

November 16, 2021

Brett Larabee
GeoEngineers, Inc.
1101 Fawcett Avenue South, Suite 200
Tacoma, WA 98402

Re: Analytical Data for Project 0353-021-00
Laboratory Reference No. 2111-086

Dear Brett:

Enclosed are the analytical results and associated quality control data for samples submitted on November 5, 2021.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: November 16, 2021
Samples Submitted: November 5, 2021
Laboratory Reference: 2111-086
Project: 0353-021-00

Case Narrative

Samples were collected on November 5, 2021 and received by the laboratory on November 5, 2021. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: November 16, 2021
Samples Submitted: November 5, 2021
Laboratory Reference: 2111-086
Project: 0353-021-00

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
B2-W-211105	11-086-01	Water	11-5-21	11-5-21	

Date of Report: November 16, 2021
Samples Submitted: November 5, 2021
Laboratory Reference: 2111-086
Project: 0353-021-00

GASOLINE RANGE ORGANICS
NWTPH-Gx

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**B2-W-211105**					
Laboratory ID:	11-086-01					
Gasoline	**ND**	100	NWTPH-Gx	11-10-21	11-10-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*102*	*66-117*				

Date of Report: November 16, 2021
Samples Submitted: November 5, 2021
Laboratory Reference: 2111-086
Project: 0353-021-00

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**B2-W-211105**					
Laboratory ID:	11-086-01					
Diesel Range Organics	**ND**	0.23	NWTPH-Dx	11-9-21	11-11-21	
Lube Oil Range Organics	**ND**	0.23	NWTPH-Dx	11-9-21	11-11-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*89*	*50-150*				

Date of Report: November 16, 2021
Samples Submitted: November 5, 2021
Laboratory Reference: 2111-086
Project: 0353-021-00

VOLATILE ORGANICS EPA 8260D
page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**B2-W-211105**					
Laboratory ID:	11-086-01					
Dichlorodifluoromethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Chloromethane	ND	1.0	EPA 8260D	11-8-21	11-8-21	
Vinyl Chloride	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Bromomethane	ND	2.3	EPA 8260D	11-8-21	11-8-21	
Chloroethane	ND	1.0	EPA 8260D	11-8-21	11-8-21	
Trichlorofluoromethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,1-Dichloroethene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Acetone	ND	5.0	EPA 8260D	11-8-21	11-8-21	
Iodomethane	ND	3.9	EPA 8260D	11-8-21	11-8-21	
Carbon Disulfide	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Methylene Chloride	ND	1.0	EPA 8260D	11-8-21	11-8-21	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Methyl t-Butyl Ether	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,1-Dichloroethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Vinyl Acetate	ND	1.0	EPA 8260D	11-8-21	11-8-21	
2,2-Dichloropropane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
2-Butanone	ND	5.0	EPA 8260D	11-8-21	11-8-21	
Bromochloromethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Chloroform	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,1,1-Trichloroethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Carbon Tetrachloride	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,1-Dichloropropene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Benzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,2-Dichloroethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Trichloroethene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,2-Dichloropropane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Dibromomethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Bromodichloromethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Methyl Isobutyl Ketone	ND	2.0	EPA 8260D	11-8-21	11-8-21	
Toluene	ND	1.0	EPA 8260D	11-8-21	11-8-21	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260D	11-8-21	11-8-21	

Date of Report: November 16, 2021
Samples Submitted: November 5, 2021
Laboratory Reference: 2111-086
Project: 0353-021-00

VOLATILE ORGANICS EPA 8260D
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**B2-W-211105**					
Laboratory ID:	11-086-01					
1,1,2-Trichloroethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Tetrachloroethene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,3-Dichloropropane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
2-Hexanone	ND	2.0	EPA 8260D	11-8-21	11-8-21	
Dibromochloromethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,2-Dibromoethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Chlorobenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Ethylbenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
m,p-Xylene	ND	0.40	EPA 8260D	11-8-21	11-8-21	
o-Xylene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Styrene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Bromoform	ND	1.0	EPA 8260D	11-8-21	11-8-21	
Isopropylbenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Bromobenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,2,3-Trichloropropane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
n-Propylbenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
2-Chlorotoluene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
4-Chlorotoluene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,3,5-Trimethylbenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
tert-Butylbenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,2,4-Trimethylbenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
sec-Butylbenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,3-Dichlorobenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
p-Isopropyltoluene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,4-Dichlorobenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,2-Dichlorobenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
n-Butylbenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,2-Dibromo-3-chloropropane	ND	1.0	EPA 8260D	11-8-21	11-8-21	
1,2,4-Trichlorobenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Hexachlorobutadiene	ND	1.0	EPA 8260D	11-8-21	11-8-21	
Naphthalene	ND	1.3	EPA 8260D	11-8-21	11-8-21	
1,2,3-Trichlorobenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*104*	*75-127*				
Toluene-d8	*101*	*80-127*				
4-Bromofluorobenzene	*101*	*78-125*				

Date of Report: November 16, 2021
Samples Submitted: November 5, 2021
Laboratory Reference: 2111-086
Project: 0353-021-00

TOTAL METALS
EPA 200.8/7470A

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**B2-W-211105**					
Laboratory ID:	11-086-01					
Arsenic	**ND**	3.3	EPA 200.8	11-9-21	11-9-21	
Barium	**47**	28	EPA 200.8	11-9-21	11-9-21	
Cadmium	**ND**	4.4	EPA 200.8	11-9-21	11-9-21	
Chromium	**ND**	11	EPA 200.8	11-9-21	11-9-21	
Lead	**1.6**	1.1	EPA 200.8	11-9-21	11-9-21	
Mercury	**ND**	0.50	EPA 7470A	11-9-21	11-9-21	
Selenium	**ND**	5.6	EPA 200.8	11-9-21	11-9-21	
Silver	**ND**	11	EPA 200.8	11-9-21	11-9-21	

Date of Report: November 16, 2021
Samples Submitted: November 5, 2021
Laboratory Reference: 2111-086
Project: 0353-021-00

DISSOLVED METALS
EPA 200.8/7470A

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**B2-W-211105**					
Laboratory ID:	11-086-01					
Arsenic	**ND**	3.0	EPA 200.8		11-9-21	
Barium	**ND**	25	EPA 200.8		11-9-21	
Cadmium	**ND**	4.0	EPA 200.8		11-9-21	
Chromium	**ND**	10	EPA 200.8		11-9-21	
Lead	**ND**	1.0	EPA 200.8		11-9-21	
Mercury	**ND**	0.50	EPA 7470A		11-9-21	
Selenium	**ND**	5.0	EPA 200.8		11-9-21	
Silver	**ND**	10	EPA 200.8		11-9-21	

Date of Report: November 16, 2021
Samples Submitted: November 5, 2021
Laboratory Reference: 2111-086
Project: 0353-021-00

GASOLINE RANGE ORGANICS
NWTPH-Gx
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1110W1					
Gasoline	**ND**	100	NWTPH-Gx	11-10-21	11-10-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*101*	*66-117*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	11-083-02										
	ORIG	DUP									
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*103*	*102*	*66-117*			

Date of Report: November 16, 2021
Samples Submitted: November 5, 2021
Laboratory Reference: 2111-086
Project: 0353-021-00

DIESEL AND HEAVY OIL RANGE ORGANICS
NWTPH-Dx
QUALITY CONTROL

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1109W1					
Diesel Range Organics	**ND**	0.16	NWTPH-Dx	11-9-21	11-10-21	
Lube Oil Range Organics	**ND**	0.16	NWTPH-Dx	11-9-21	11-10-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*91*	*50-150*				

Analyte	Result		Spike Level		Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE										
Laboratory ID:	11-080-21									
	ORIG	DUP								
Diesel Range Organics	**6.58**	**6.50**	NA	NA		NA	NA	1	NA	
Lube Oil Range Organics	**2.03**	**1.87**	NA	NA		NA	NA	8	NA	
Surrogate:										
o-Terphenyl						*81*	*88*	*50-150*		

Date of Report: November 16, 2021
Samples Submitted: November 5, 2021
Laboratory Reference: 2111-086
Project: 0353-021-00

VOLATILE ORGANICS EPA 8260D
QUALITY CONTROL
page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1108W1					
Dichlorodifluoromethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Chloromethane	ND	1.0	EPA 8260D	11-8-21	11-8-21	
Vinyl Chloride	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Bromomethane	ND	2.3	EPA 8260D	11-8-21	11-8-21	
Chloroethane	ND	1.0	EPA 8260D	11-8-21	11-8-21	
Trichlorofluoromethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,1-Dichloroethene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Acetone	ND	5.0	EPA 8260D	11-8-21	11-8-21	
Iodomethane	ND	3.9	EPA 8260D	11-8-21	11-8-21	
Carbon Disulfide	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Methylene Chloride	ND	1.0	EPA 8260D	11-8-21	11-8-21	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Methyl t-Butyl Ether	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,1-Dichloroethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Vinyl Acetate	ND	1.0	EPA 8260D	11-8-21	11-8-21	
2,2-Dichloropropane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
2-Butanone	ND	5.0	EPA 8260D	11-8-21	11-8-21	
Bromochloromethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Chloroform	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,1,1-Trichloroethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Carbon Tetrachloride	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,1-Dichloropropene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Benzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,2-Dichloroethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Trichloroethene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,2-Dichloropropane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Dibromomethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Bromodichloromethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Methyl Isobutyl Ketone	ND	2.0	EPA 8260D	11-8-21	11-8-21	
Toluene	ND	1.0	EPA 8260D	11-8-21	11-8-21	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260D	11-8-21	11-8-21	

Date of Report: November 16, 2021
Samples Submitted: November 5, 2021
Laboratory Reference: 2111-086
Project: 0353-021-00

VOLATILE ORGANICS EPA 8260D
QUALITY CONTROL
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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1108W1					
1,1,2-Trichloroethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Tetrachloroethene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,3-Dichloropropane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
2-Hexanone	ND	2.0	EPA 8260D	11-8-21	11-8-21	
Dibromochloromethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,2-Dibromoethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Chlorobenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Ethylbenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
m,p-Xylene	ND	0.40	EPA 8260D	11-8-21	11-8-21	
o-Xylene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Styrene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Bromoform	ND	1.0	EPA 8260D	11-8-21	11-8-21	
Isopropylbenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Bromobenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,2,3-Trichloropropane	ND	0.20	EPA 8260D	11-8-21	11-8-21	
n-Propylbenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
2-Chlorotoluene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
4-Chlorotoluene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,3,5-Trimethylbenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
tert-Butylbenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,2,4-Trimethylbenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
sec-Butylbenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,3-Dichlorobenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
p-Isopropyltoluene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,4-Dichlorobenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,2-Dichlorobenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
n-Butylbenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
1,2-Dibromo-3-chloropropane	ND	1.0	EPA 8260D	11-8-21	11-8-21	
1,2,4-Trichlorobenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Hexachlorobutadiene	ND	1.0	EPA 8260D	11-8-21	11-8-21	
Naphthalene	ND	1.3	EPA 8260D	11-8-21	11-8-21	
1,2,3-Trichlorobenzene	ND	0.20	EPA 8260D	11-8-21	11-8-21	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*102*	*75-127*				
Toluene-d8	*101*	*80-127*				
4-Bromofluorobenzene	*98*	*78-125*				

Date of Report: November 16, 2021
Samples Submitted: November 5, 2021
Laboratory Reference: 2111-086
Project: 0353-021-00

VOLATILE ORGANICS EPA 8260D
QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB1108W1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**11.0**	**11.1**	10.0	10.0	110	111	78-125	1	19	
Benzene	**10.7**	**10.7**	10.0	10.0	107	107	80-119	0	16	
Trichloroethene	**11.1**	**11.1**	10.0	10.0	111	111	80-121	0	18	
Toluene	**10.6**	**10.7**	10.0	10.0	106	107	80-117	1	18	
Chlorobenzene	**10.4**	**10.6**	10.0	10.0	104	106	80-117	2	17	
Surrogate:										
Dibromofluoromethane					*96*	*97*	*75-127*			
Toluene-d8					*100*	*100*	*80-127*			
4-Bromofluorobenzene					*97*	*97*	*78-125*			

Date of Report: November 16, 2021
Samples Submitted: November 5, 2021
Laboratory Reference: 2111-086
Project: 0353-021-00

TOTAL METALS
EPA 200.8/7470A
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1109WM1					
Arsenic	**ND**	3.3	EPA 200.8	11-9-21	11-9-21	
Barium	**ND**	28	EPA 200.8	11-9-21	11-9-21	
Cadmium	**ND**	4.4	EPA 200.8	11-9-21	11-9-21	
Chromium	**ND**	11	EPA 200.8	11-9-21	11-9-21	
Lead	**ND**	1.1	EPA 200.8	11-9-21	11-9-21	
Selenium	**ND**	5.6	EPA 200.8	11-9-21	11-9-21	
Silver	**ND**	11	EPA 200.8	11-9-21	11-9-21	
Laboratory ID:	MB1109W1					
Mercury	**ND**	0.50	EPA 7470A	11-9-21	11-9-21	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	11-086-01										
	ORIG	DUP									
Arsenic	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Barium	**47.1**	**44.2**	NA	NA		NA		NA	6	20	
Cadmium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Chromium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Lead	**1.56**	**1.45**	NA	NA		NA		NA	7	20	
Selenium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Silver	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Laboratory ID:	11-087-05										
Mercury	**ND**	**ND**	NA	NA		NA		NA	NA	20	
MATRIX SPIKES											
Laboratory ID:	11-086-01										
	MS	MSD	MS	MSD		MS	MSD				
Arsenic	**120**	**122**	111	111	ND	**108**	**110**	75-125	1	20	
Barium	**156**	**161**	111	111	47.1	**99**	**103**	75-125	3	20	
Cadmium	**111**	**119**	111	111	ND	**100**	**107**	75-125	7	20	
Chromium	**117**	**121**	111	111	ND	**106**	**109**	75-125	3	20	
Lead	**115**	**118**	111	111	1.56	**102**	**105**	75-125	2	20	
Selenium	**114**	**116**	111	111	ND	**103**	**104**	75-125	1	20	
Silver	**116**	**120**	111	111	ND	**105**	**108**	75-125	3	20	
Laboratory ID:	11-087-05										
Mercury	**11.9**	**12.4**	12.5	12.5	ND	**95**	**99**	75-125	4	20	

Date of Report: November 16, 2021
Samples Submitted: November 5, 2021
Laboratory Reference: 2111-086
Project: 0353-021-00

DISSOLVED METALS
EPA 200.8/7470A
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB1108F1					
Arsenic	**ND**	3.0	EPA 200.8	11-8-21	11-9-21	
Barium	**ND**	25	EPA 200.8	11-8-21	11-9-21	
Cadmium	**ND**	4.0	EPA 200.8	11-8-21	11-9-21	
Chromium	**ND**	10	EPA 200.8	11-8-21	11-9-21	
Lead	**ND**	1.0	EPA 200.8	11-8-21	11-9-21	
Selenium	**ND**	5.0	EPA 200.8	11-8-21	11-9-21	
Silver	**ND**	10	EPA 200.8	11-8-21	11-9-21	
Laboratory ID:	MB1109D1					
Mercury	**ND**	0.50	EPA 7470A		11-9-21	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	11-088-01										
	ORIG	DUP									
Arsenic	**82.4**	**83.0**	NA	NA		NA		NA	1	20	
Barium	**38.4**	**38.4**	NA	NA		NA		NA	0	20	
Cadmium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Chromium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Lead	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Selenium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Silver	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Laboratory ID:	11-086-01										
Mercury	**ND**	**ND**	NA	NA		NA		NA	NA	20	
MATRIX SPIKES											
Laboratory ID:	11-088-01										
	MS	MSD	MS	MSD		MS	MSD				
Arsenic	**165**	**166**	80.0	80.0	82.4	**104**	**105**	75-125	1	20	
Barium	**119**	**116**	80.0	80.0	38.4	**101**	**97**	75-125	3	20	
Cadmium	**79.0**	**77.4**	80.0	80.0	ND	**99**	**97**	75-125	2	20	
Chromium	**83.4**	**84.4**	80.0	80.0	ND	**104**	**106**	75-125	1	20	
Lead	**79.4**	**78.4**	80.0	80.0	ND	**99**	**98**	75-125	1	20	
Selenium	**84.8**	**80.2**	80.0	80.0	ND	**106**	**100**	75-125	6	20	
Silver	**82.4**	**82.2**	80.0	80.0	ND	**103**	**103**	75-125	0	20	
Laboratory ID:	11-086-01										
Mercury	**14.0**	**13.9**	12.5	12.5	ND	**112**	**111**	75-125	0	20	

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a sulfuric acid/silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in methods 8260 & 8270, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Y1 - Negative effects of the matrix from this sample on the instrument caused values for this analyte in the bracketing continuing calibration verification standard (CCVs) to be outside of 20% acceptance criteria. Because of this, quantitation limits and sample concentrations should be considered estimates.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

Chain of Custody

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Company: GeoEngineers
Project Number: 0353-021-00
Project Name: City of Lacey - Lift Station 3
Project Manager: Brett Larabee
Sampled by: Paul Robinette

Turnaround Request (in working days)

(Check One)

- ☐ Same Day
- ☐ 1 Day
- ☐ 2 Days
- ☐ 3 Days
- ☒ Standard (7 Days)
- ☐ _____ (other)

Laboratory Number: 11-086

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx (☐ Acid / SG Clean-up)	Volatiles 8260C	Halogenated Volatiles 8260C	EDB EPA 8011 (Waters Only)	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A	*Metals - Total	*Metals - Dissolved (Field Filtered)			% Moisture
1	B2-W-211105	11/05/21	1145	W	11		X		X	X													X	X			

	Signature	Company	Date	Time
Relinquished		GE	11/5/21	2:45
Received		a/pha	11/5/21	2:45
Relinquished		a/pha	11/5/21	4:55
Received		GE	11/5/21	1655
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

*RCRA Metals, Hold remaining sample for possible additional metals.

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

APPENDIX D
Slug Testing Results

APPENDIX D
SLUG TESTING RESULTS

Introduction

We performed single-well "slug" tests in wells B-1 and B-2 on November 2, 2021. The slug tests were performed to estimate the hydraulic conductivity of the saturated soils adjacent to the respective wells screens. The tests consisted of initially rapidly inserting a polyvinyl chloride (PVC) slug to raise the groundwater level from static and allowing the water level to recover to static ("falling" head test). The slug was then rapidly removed, causing the water level to initially decrease before recovering to static ("rising" head test). To test for bias and assure repeatability, eight pairs of falling and rising head tests were performed in well B-1; three pairs of falling and rising head tests were performed in well B-2.

Methodology

A vented 0 to 15 pounds per square inch gauge (psig) INW PT2X pressure transducer was installed in the well and set to record water levels four times per second throughout the testing period. A slug (weighted 5-foot length of sealed PVC casing) of known volume was rapidly lowered into the well to instantaneously displace the water column and force water to flow out of the well into the surrounding aquifer zone. The declining water level in the well immediately after slug insertion was monitored until it returned to the approximate initial water level (falling head).

The slug was then rapidly removed instantaneously lowering the water column and forcing water to flow back into the well from the surrounding aquifer zone. The rising water level was monitored until it returned to the approximate initial water level (rising head). Groundwater levels were measured with a pressure sensor (with built-in datalogger) and manual electronic water level meter before, during and after each aquifer slug test.

Slug Test Analysis

We employed two analytical methods to interpret the slug test data. These methods are those developed by Bouwer & Rice (1976) and Hvorslev (1957). We used the commercial software program Aqtesolv (version 4.5; HydroSOLVE, Inc) to perform the interpretation. The average hydraulic conductivity for the tested zones is calculated from the slope of a straight line fitted through the data, with emphasis placed on the larger values of normalized head. The resulting values for hydraulic conductivity determined from each tested well are listed in Tables D-1 and D-2 below. Figures D-1 through D-16 present the individual test interpretation plots.

TABLE D-1. SLUG TEST RESULTS FOR WELL B-1

Slug Test	Slug Test Stage	Estimated Hydraulic Conductivity (ft/d)		Estimated Hydraulic Conductivity (cm/sec)	
		Bouwer & Rice	Hvorslev	Bouwer & Rice	Hvorslev
Test 1	Falling-Head 1	20.5	31.0	7.2×10^{-3}	1.1×10^{-2}
	Rising-Head 1	25.4	36.9	9.0×10^{-3}	1.2×10^{-2}
Test 2	Falling-Head 2	-	-	-	-
	Rising-Head 2	18.9	27.1	6.7×10^{-3}	9.6×10^{-3}
Test 3	Falling-Head 3	-	-	-	-
	Rising-Head 3	10.6	19.1	3.7×10^{-3}	6.7×10^{-3}
Test 4	Falling-Head 4	-	-	-	-
	Rising-Head 4	15.1	23.6	5.3×10^{-3}	8.3×10^{-3}
Test 5	Falling-Head 5	-	-	-	-
	Rising-Head 5	14.4	28.9	5.1×10^{-3}	1.0×10^{-2}
Test 6	Falling-Head 6	-	-	-	-
	Rising-Head 6	18.7	33.2	6.6×10^{-3}	1.2×10^{-2}
Test 7	Falling-Head 7	-	-	-	-
	Rising-Head 7	18.6	34.5	6.6×10^{-3}	1.2×10^{-2}
Test 8	Falling-Head 8	-	-	-	-
	Rising-Head 8	18.6	32.3	6.6×10^{-3}	1.1×10^{-2}
	Arithmetic Mean	**23.7**		**8.4×10^{-3}**	
	Geometric Mean	**22.2**		**7.8×10^{-3}**	

TABLE D-2. SLUG TEST RESULTS FOR WELL B-2

Slug Test	Slug Test Stage	Estimated Hydraulic Conductivity (ft/d)		Estimated Hydraulic Conductivity (cm/sec)	
		Bouwer & Rice	Hvorslev	Bouwer & Rice	Hvorslev
Test 1	Falling-Head 1	1.0	1.1	3.4×10^{-4}	3.9×10^{-4}
	Rising-Head 1	0.9	1.3	3.2×10^{-4}	4.6×10^{-4}
Test 2	Falling-Head 2	0.7	1.0	2.5×10^{-4}	3.5×10^{-4}
	Rising-Head 2	0.8	1.1	2.8×10^{-4}	3.9×10^{-4}
Test 3	Falling-Head 3	0.7	1.0	2.5×10^{-4}	3.5×10^{-4}
	Rising-Head 3	0.7	1.0	2.5×10^{-4}	3.5×10^{-4}
	Arithmetic Mean	**0.9**		**3.3×10^{-4}**	
	Geometric Mean	**0.9**		**3.2×10^{-4}**	

Note that only the first falling head test for well B-1 was able to be interpretated. Results summary:

- Well B-1 – range between 10.6 and 25.4 feet per day (ft/day), which is typical for a silty sand to poorly graded sand with silt.
- Well B-2 – range from 0.7 to 1.3 ft/day, thus more than one order of magnitude lower than for well B-1. This range is typical for a sandy silt to silty sand. These results were lower than expected for the soil texture described during drilling.

Assuming a saturated thickness at both wells of 45 feet (total drilled depth minus a static groundwater depth of 5 feet), the average hydraulic conductivities yield aquifer transmissivities of 1,000 square feet per day (sq ft/day) at well B-1 and 41 sq ft/day at well B-2.

The average bulk permeability estimates based on grain-size data for three samples from well B-2 ranged from 4.5 to 31.2 ft/day. This range is more in line with the soil textures we observed during drilling.

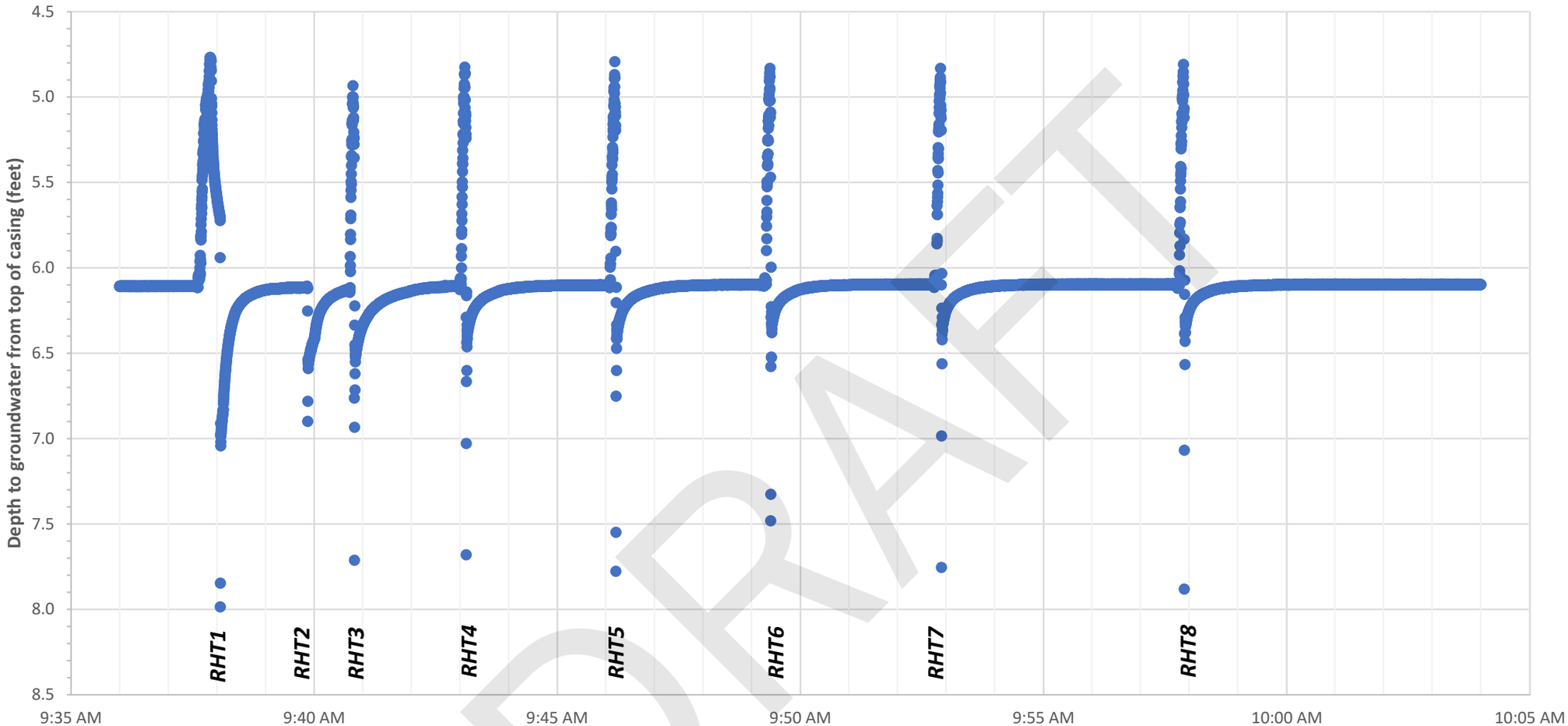
References

Bouwer, H. and R.C. Rice, 1976. A slug test method for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells, Water Resources Research, vol. 12, no. 3, pp. 423-428.

Bouwer, H., 1989. The Bouwer and Rice slug test--an update, Ground Water, vol. 27, no. 3, pp. 304-309.

Hvorslev, M.J., 1951. Time Lag and Soil Permeability in Ground-Water Observations, Bull. No. 36, Waterways Exper. Sta. Corps of Engrs, U.S. Army, Vicksburg, Mississippi, pp. 1-50.

HydroSOLVE, Inc. Aqtesolv version 4.5. http://www.aqtesolv.com/default.htm.



Notes:
1. Approx. ground surface = Elev. 199 ft (NGVD29)
2. Static groundwater = 6.11 ft bgs (Elev. 193.9 ft) on 11/2/21
3. Well screen = 7-17 ft bgs
4. RHT = rising head test

Slug Test Data - Well B-1

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Figure D-1

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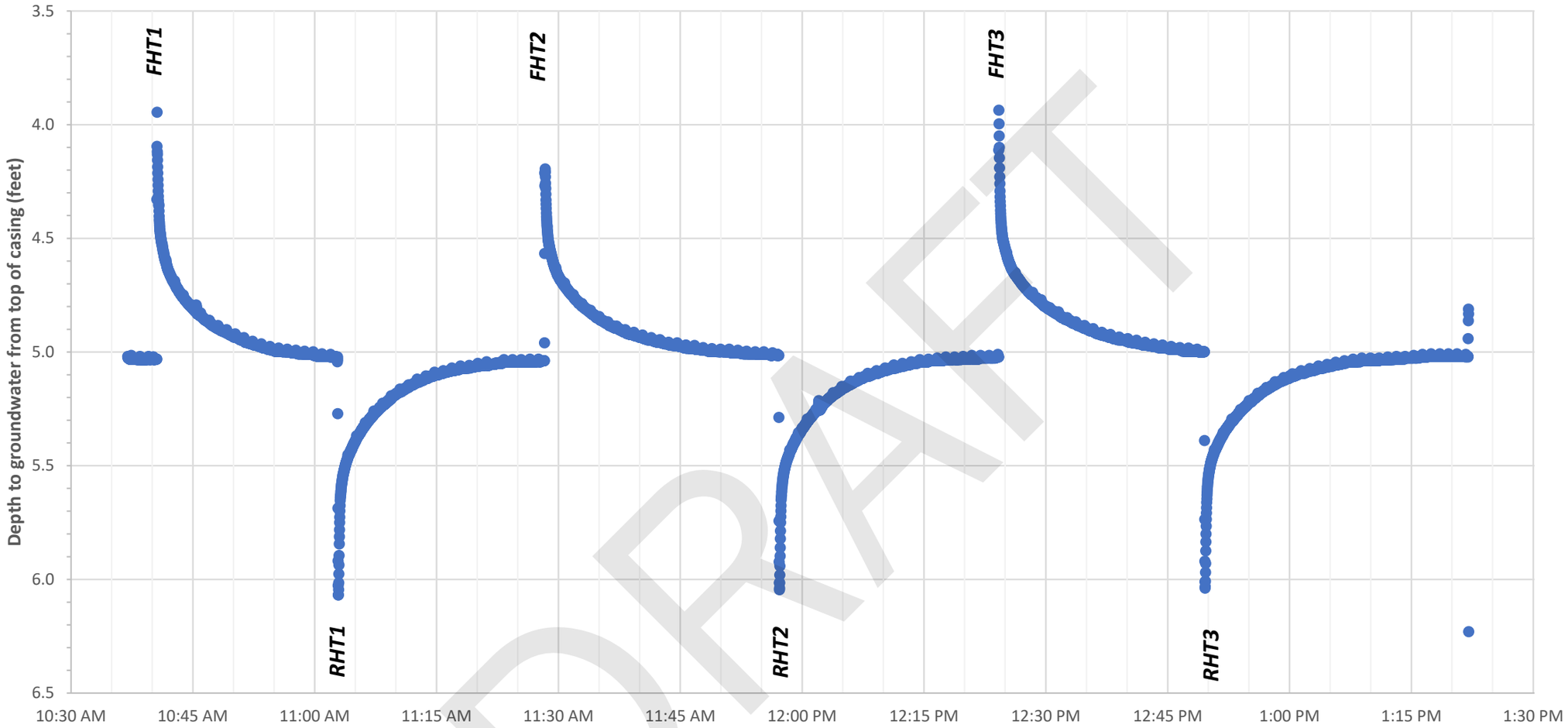

Notes:
1. Approx. ground surface = Elev. 199 ft (NGVD29)
2. Static groundwater = 5.02 ft bgs (Elev. 194.0 ft) on 11/2/21
3. Well screen = 5-15 ft bgs
4. FHT = falling head test; RHT = rising head test

Slug Test Data - Well B-2

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Figure D-2

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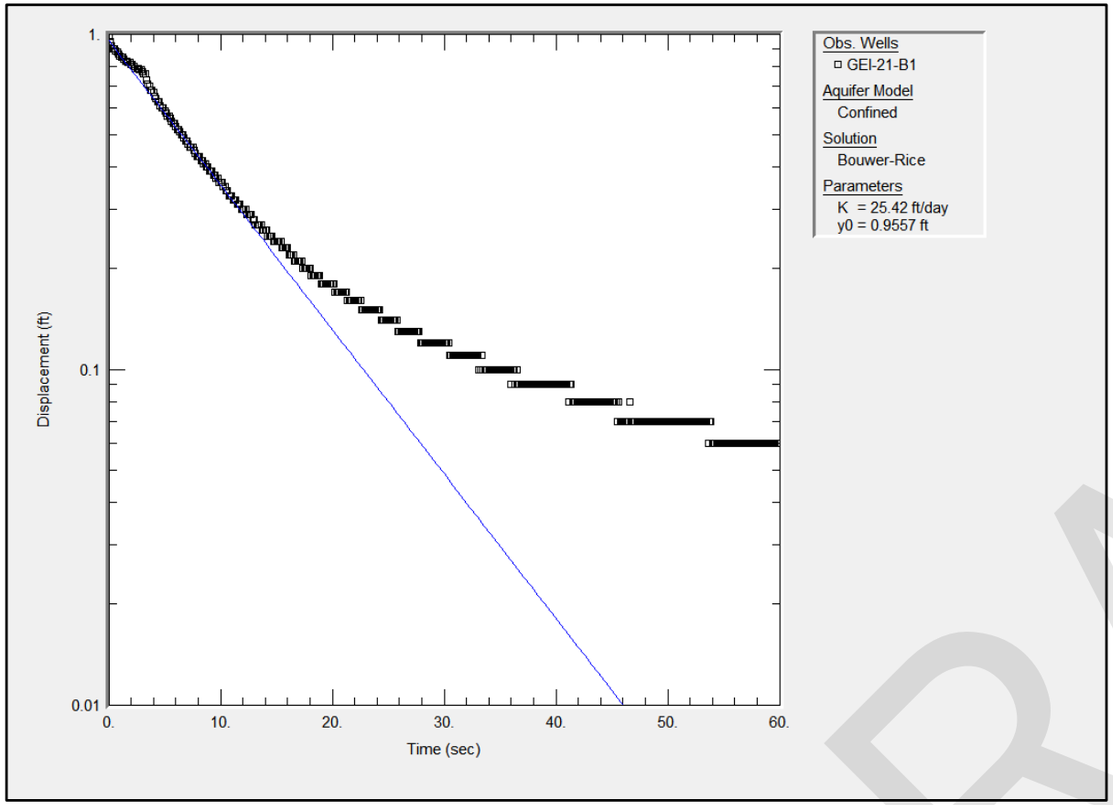

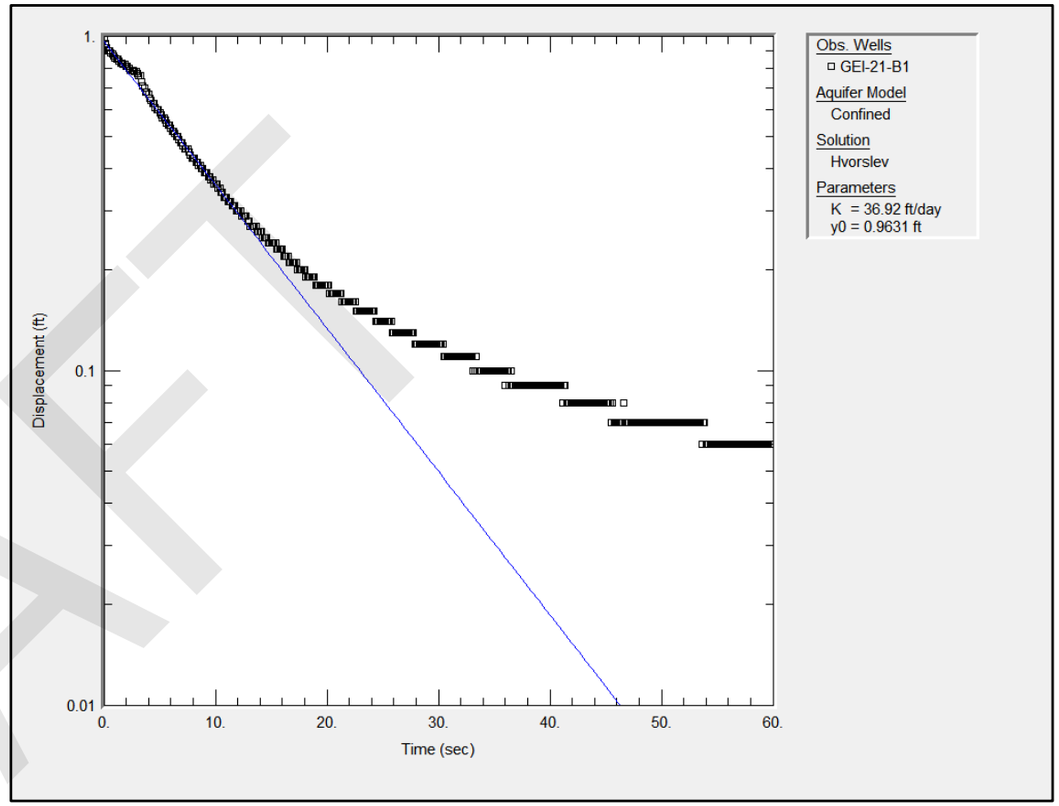

Notes:
1. Approx. ground surface = Elev. 199 ft (NGVD29)
2. Static groundwater = 6.11 ft bgs (Elev. 193.9 ft) on 11/2/21
3. Well screen = 7-17 ft bgs

Slug Test Interpretation – Rising Head Test #1
Well B-1

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Figure D-3

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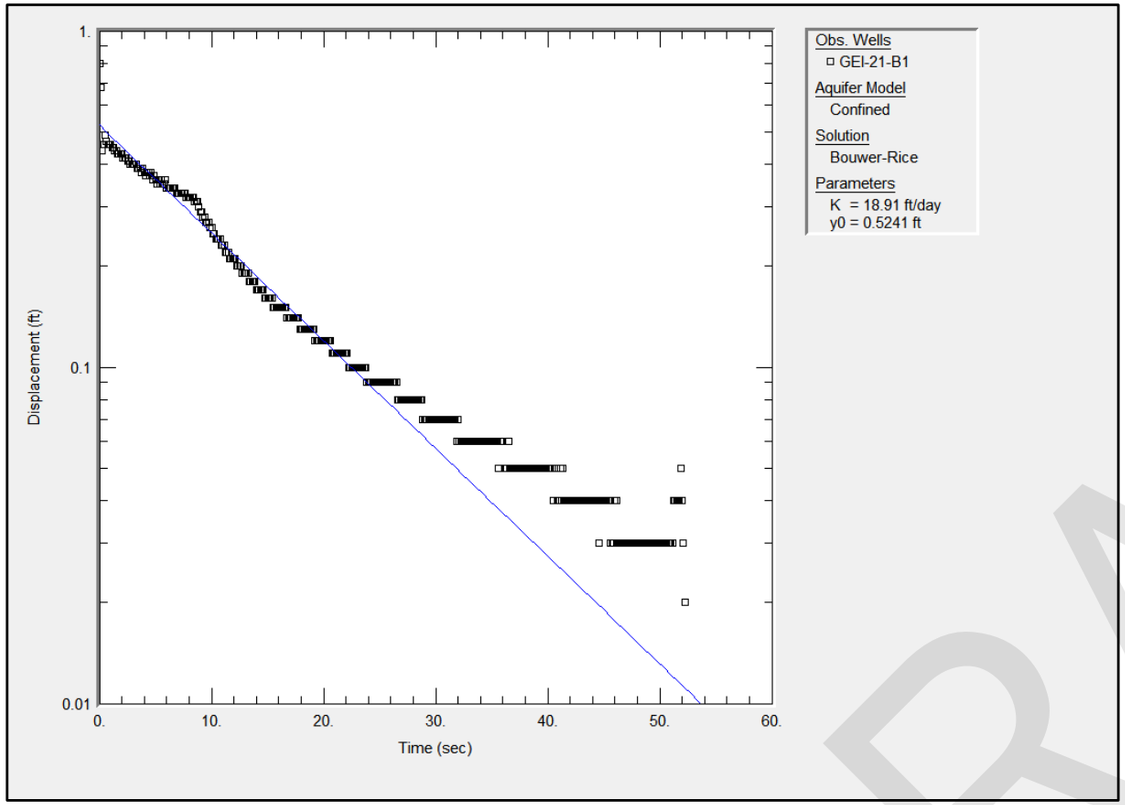

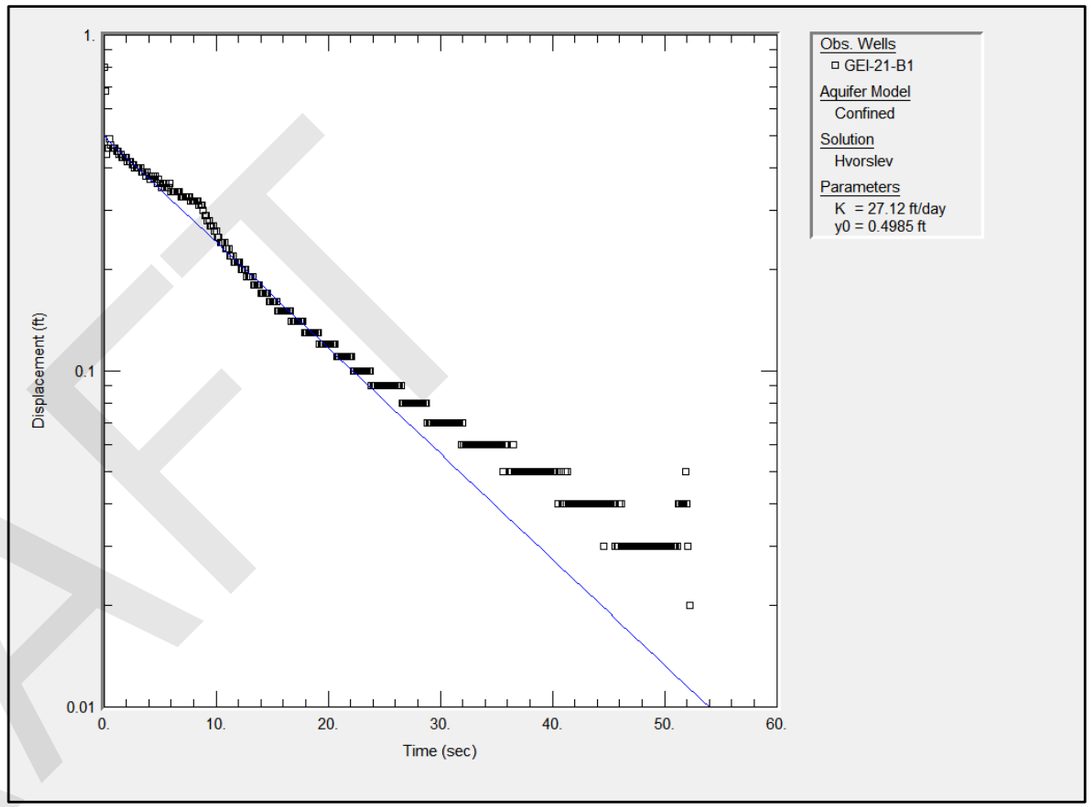

Notes:
1. Approx. ground surface = Elev. 199 ft (NGVD29)
2. Static groundwater = 6.11 ft bgs (Elev. 193.9 ft) on 11/2/21
3. Well screen = 7-17 ft bgs

Slug Test Interpretation – Rising Head Test #2
Well B-1

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Figure D-4

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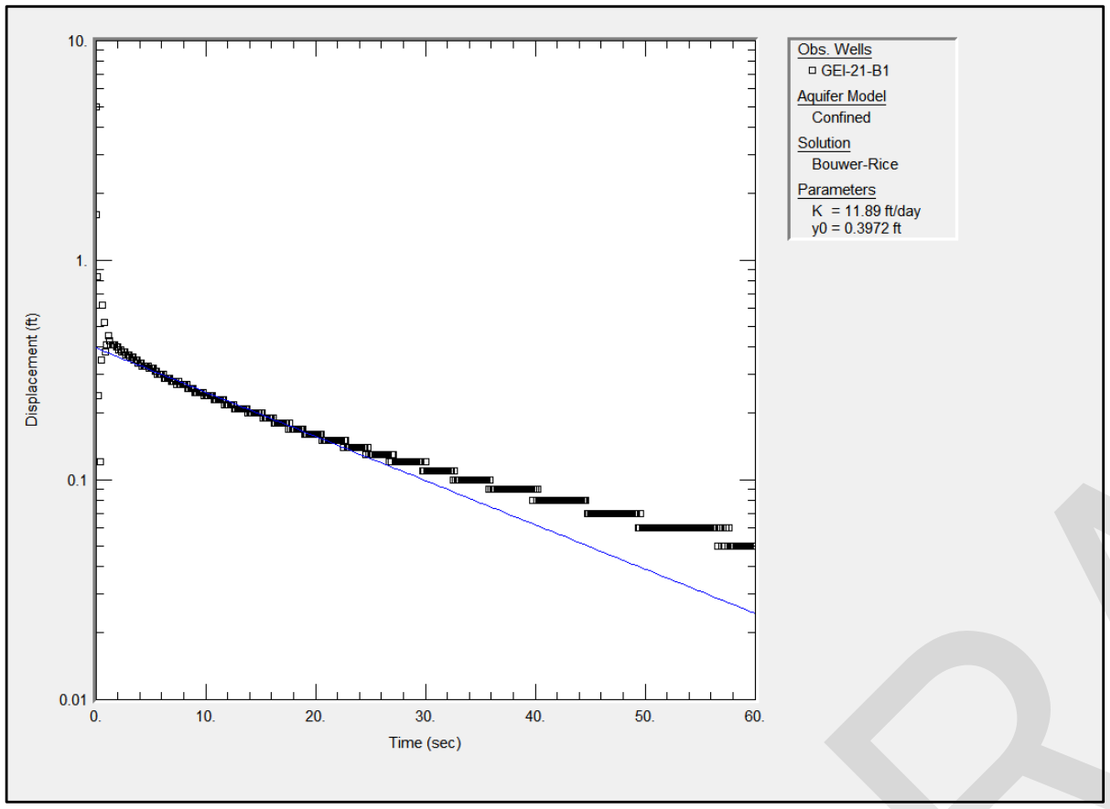

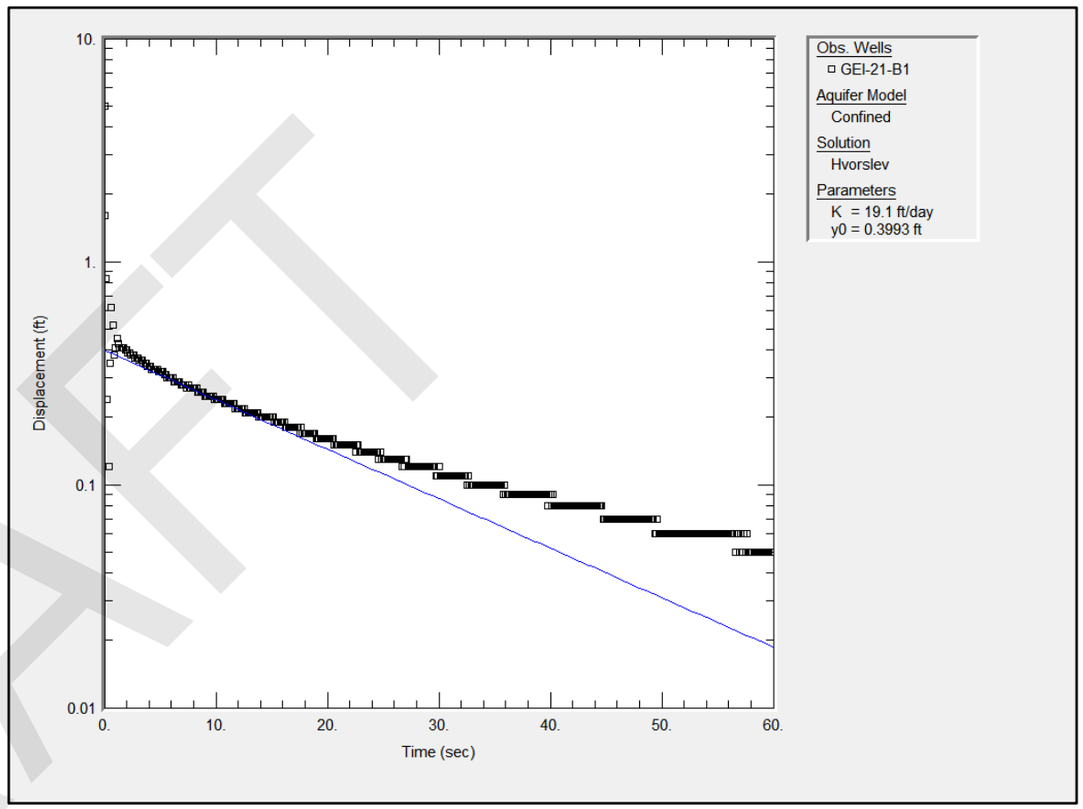

Notes:
1. Approx. ground surface = Elev. 199 ft (NGVD29)
2. Static groundwater = 6.11 ft bgs (Elev. 193.9 ft) on 11/2/21
3. Well screen = 7-17 ft bgs

Slug Test Interpretation – Rising Head Test #3
Well B-1

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Figure D-5

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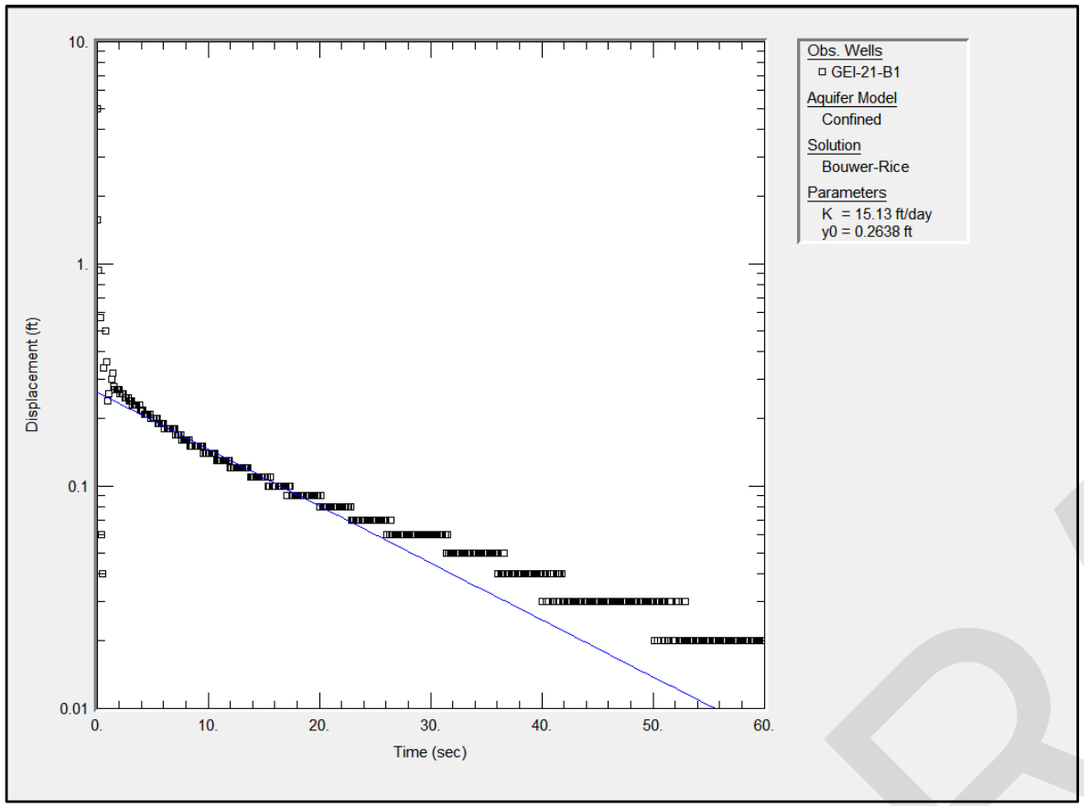

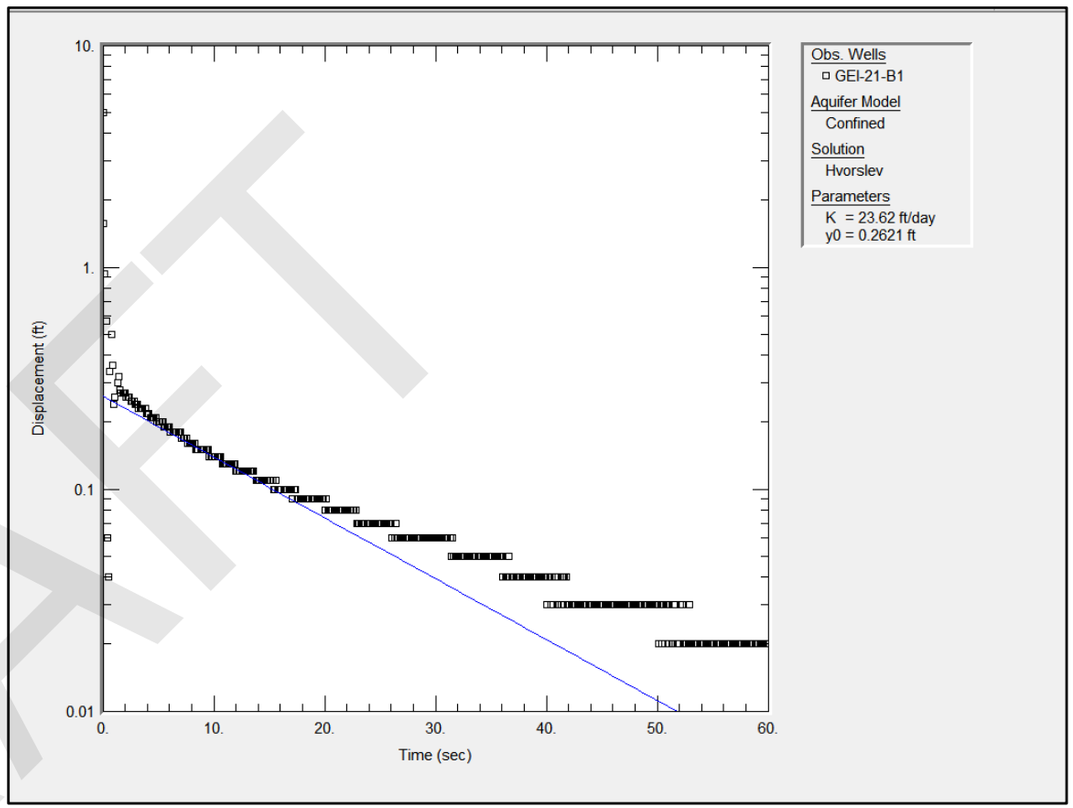

Notes:
1. Approx. ground surface = Elev. 199 ft (NGVD29)
2. Static groundwater = 6.11 ft bgs (Elev. 193.9 ft) on 11/2/21
3. Well screen = 7-17 ft bgs

Slug Test Interpretation – Rising Head Test #4
Well B-1

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Figure D-6

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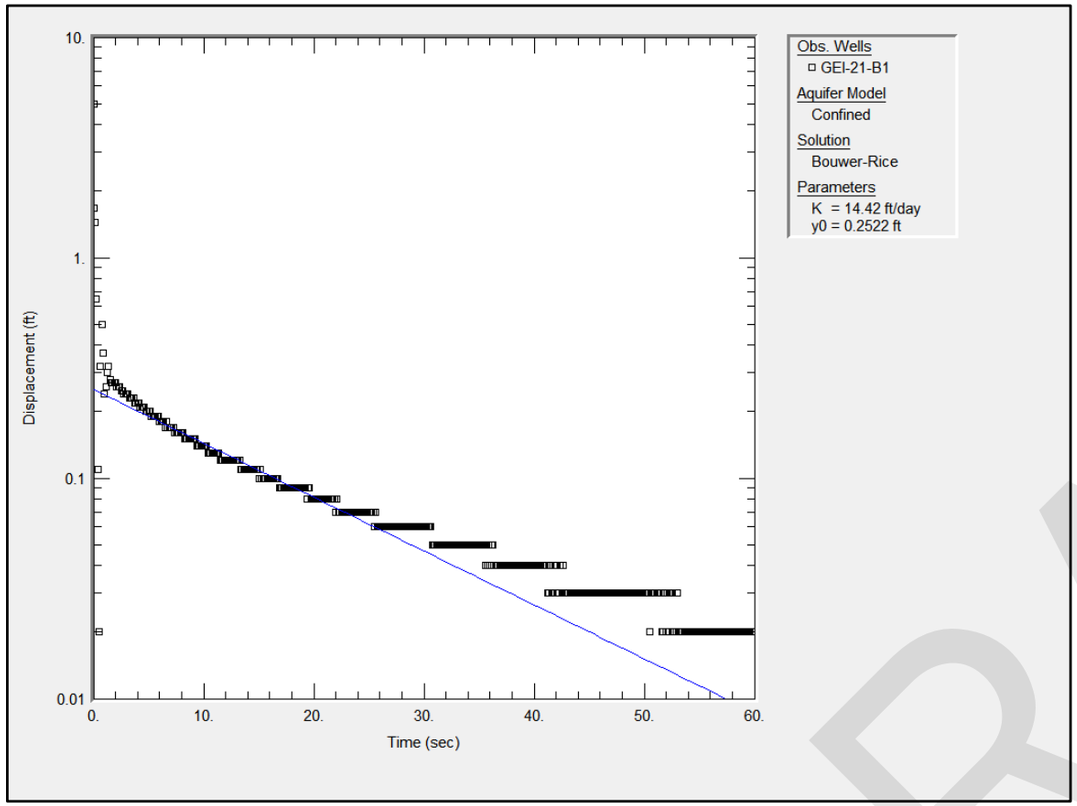

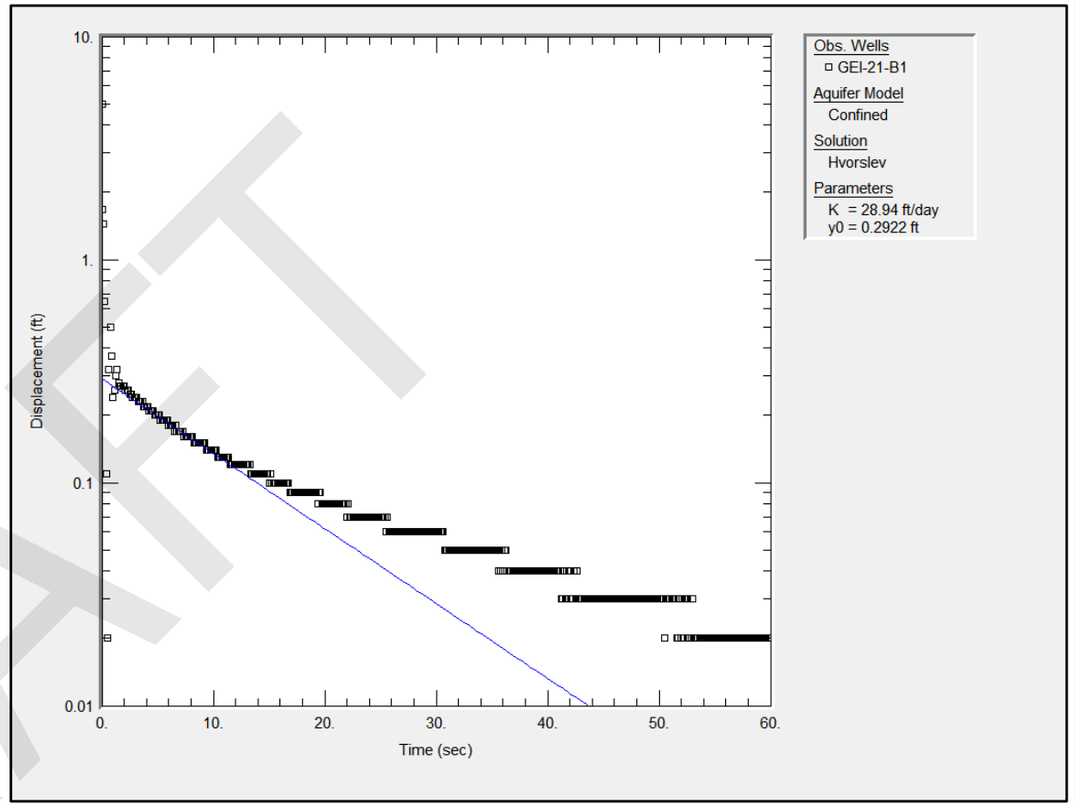

Notes:
1. Approx. ground surface = Elev. 199 ft (NGVD29)
2. Static groundwater = 6.11 ft bgs (Elev. 193.9 ft) on 11/2/21
3. Well screen = 7-17 ft bgs

Slug Test Interpretation – Rising Head Test #5
Well B-1

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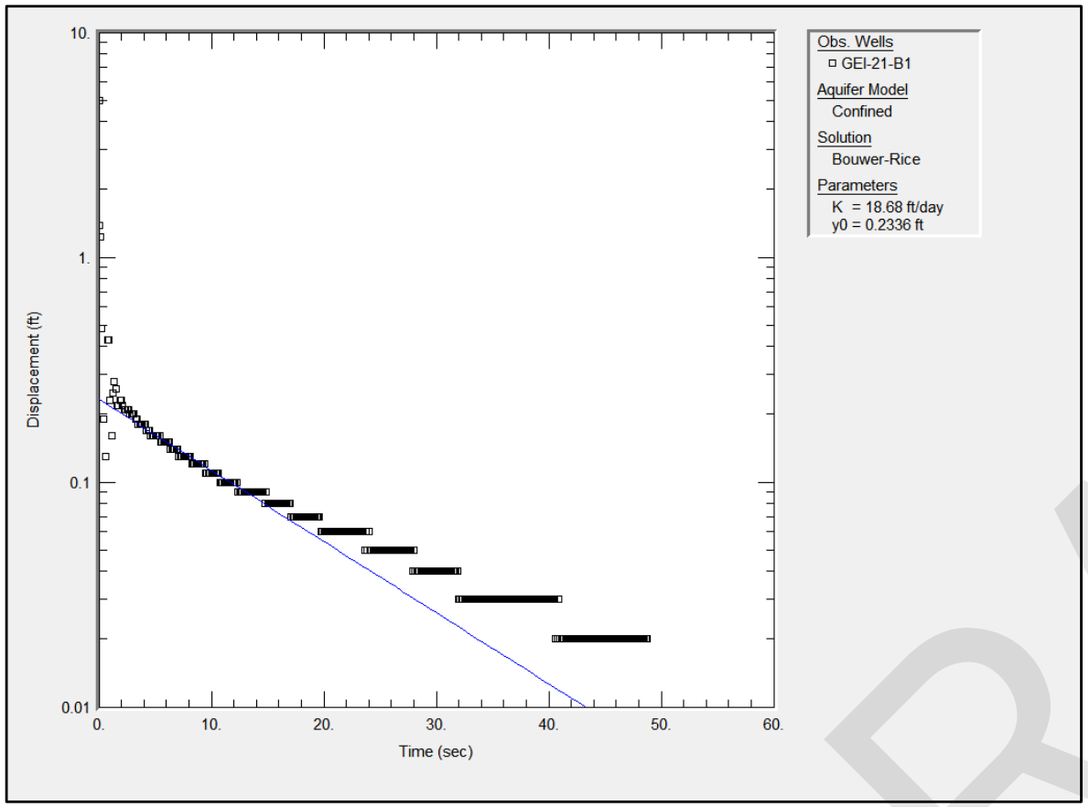
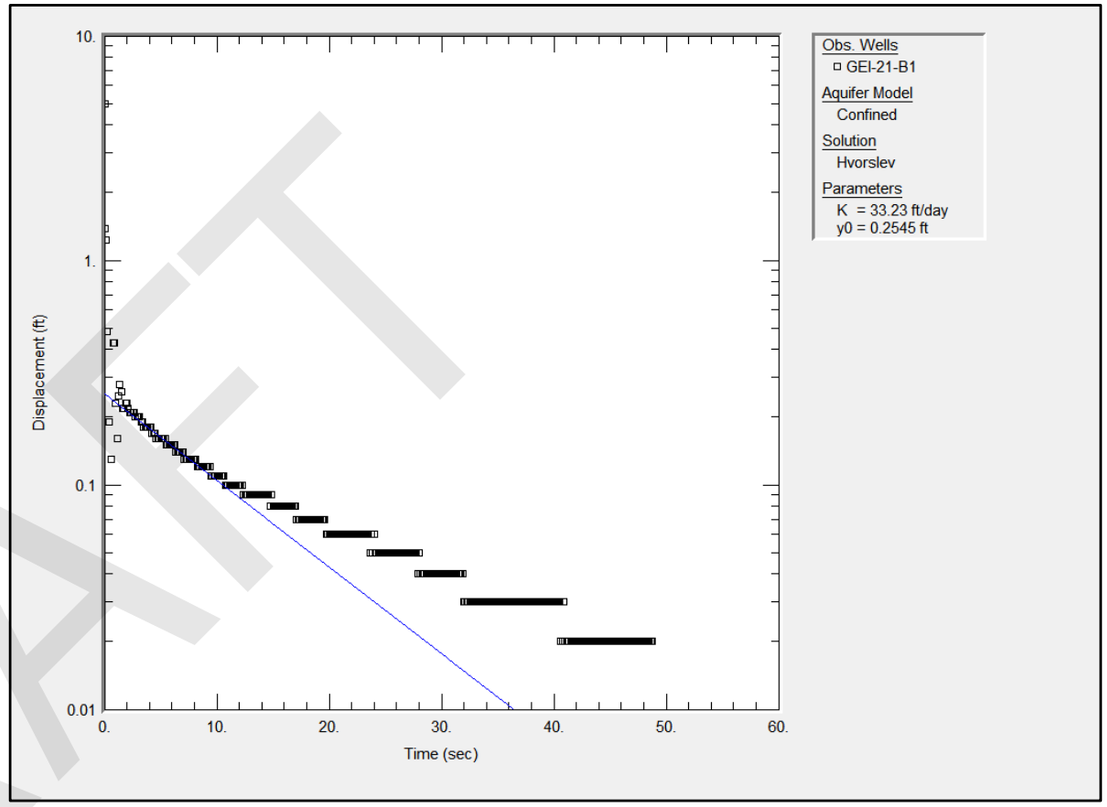
Figure D-7

00353-021-00: 11/22/21





Notes:
1. Approx. ground surface = Elev. 199 ft (NGVD29)
2. Static groundwater = 6.11 ft bgs (Elev. 193.9 ft) on 11/2/21
3. Well screen = 7-17 ft bgs

Slug Test Interpretation – Rising Head Test #6
Well B-1

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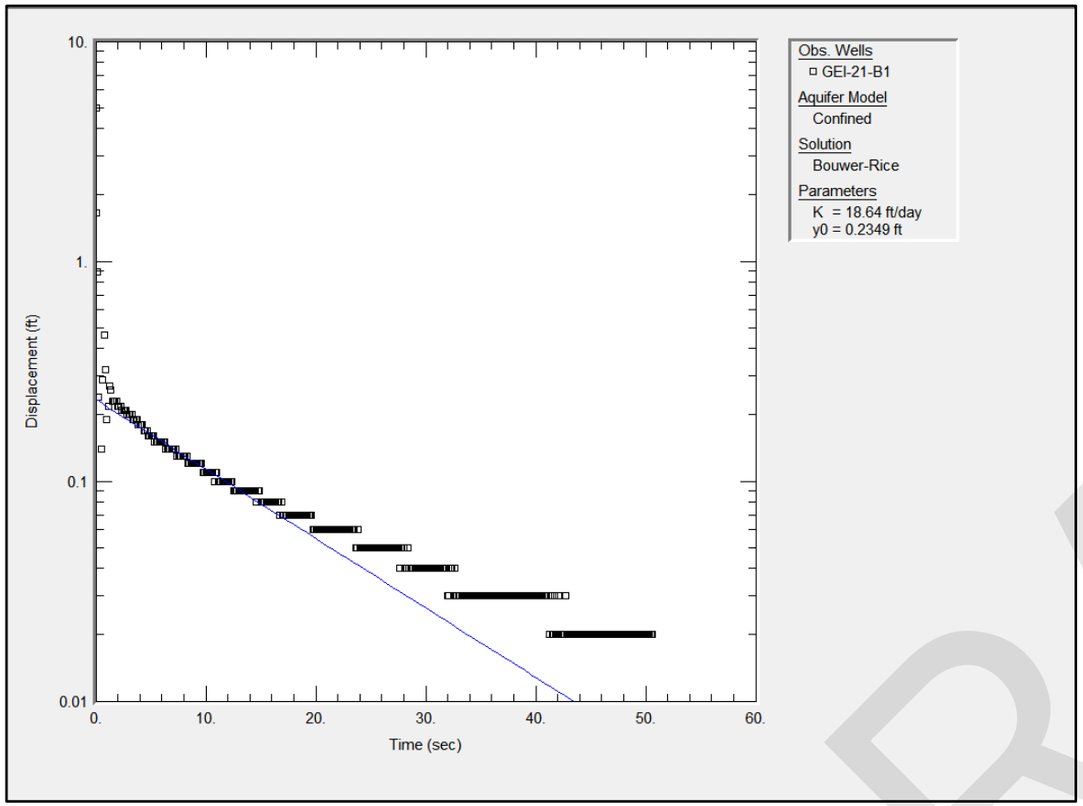
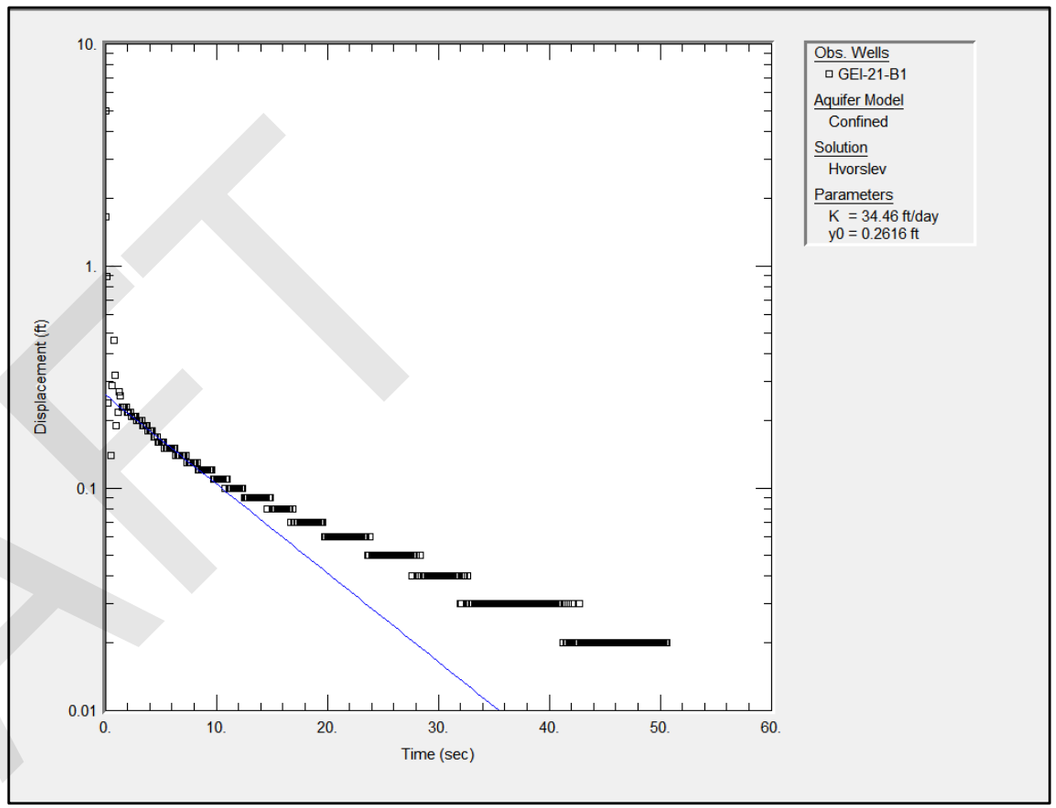
Figure D-8

00353-021-00: 11/22/21





Notes:
1. Approx. ground surface = Elev. 199 ft (NGVD29)
2. Static groundwater = 6.11 ft bgs (Elev. 193.9 ft) on 11/2/21
3. Well screen = 7-17 ft bgs

Slug Test Interpretation – Rising Head Test #7
Well B-1

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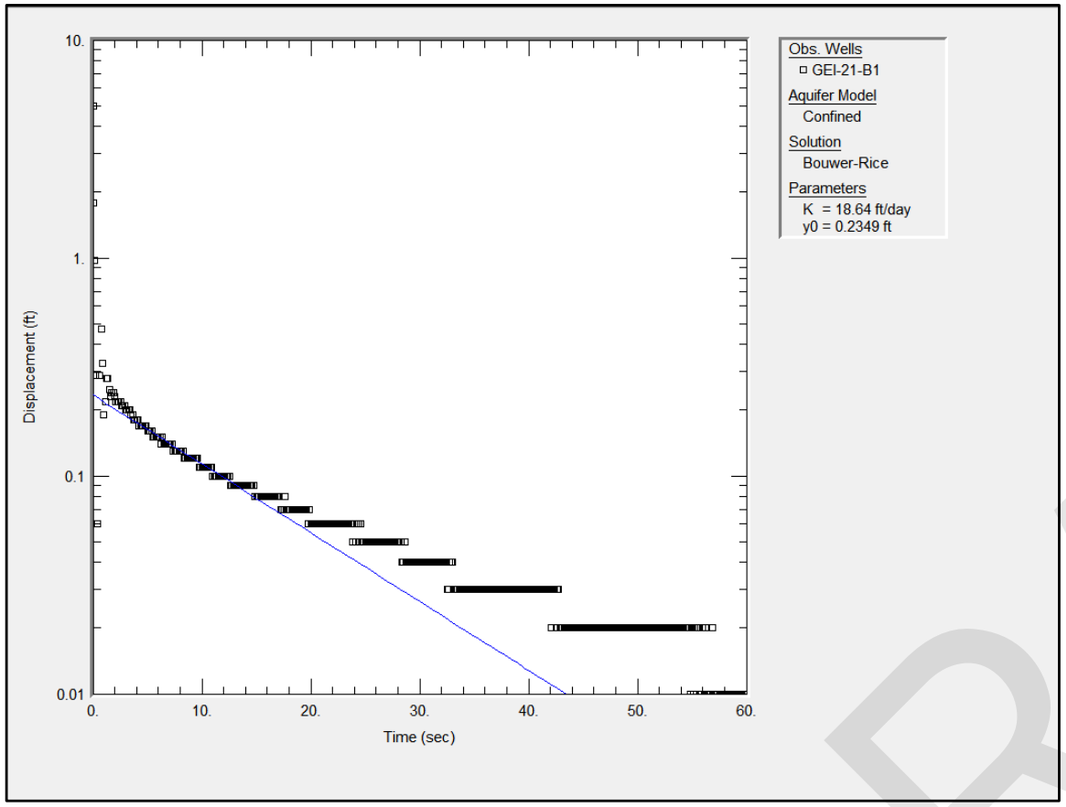
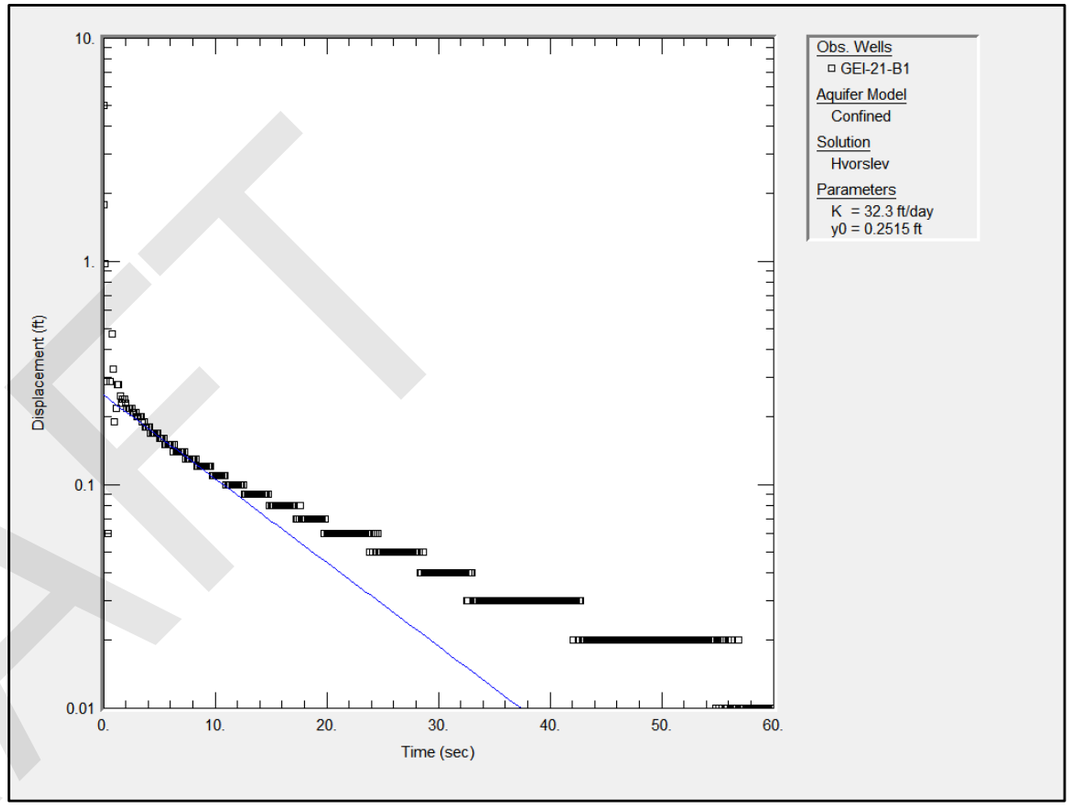
Figure D-9

00353-021-00: 11/22/21





Notes:
1. Approx. ground surface = Elev. 199 ft (NGVD29)
2. Static groundwater = 6.11 ft bgs (Elev. 193.9 ft) on 11/2/21
3. Well screen = 7-17 ft bgs

Slug Test Interpretation – Rising Head Test #8
Well B-1

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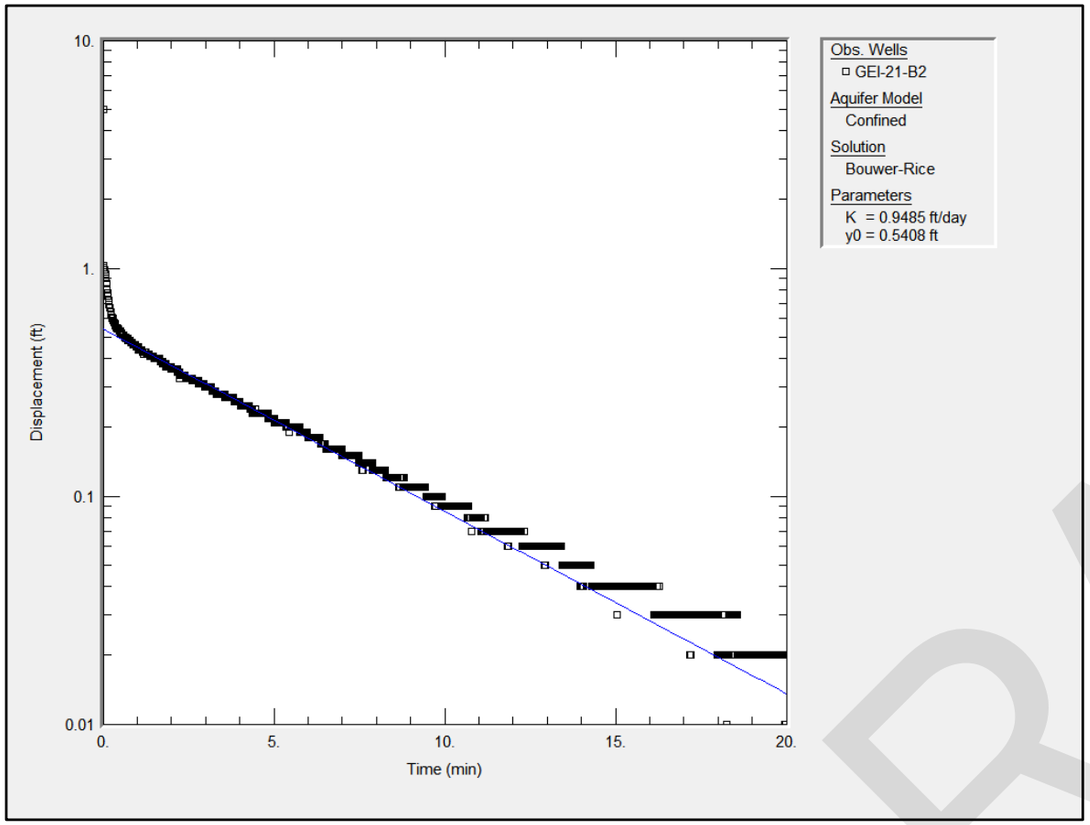
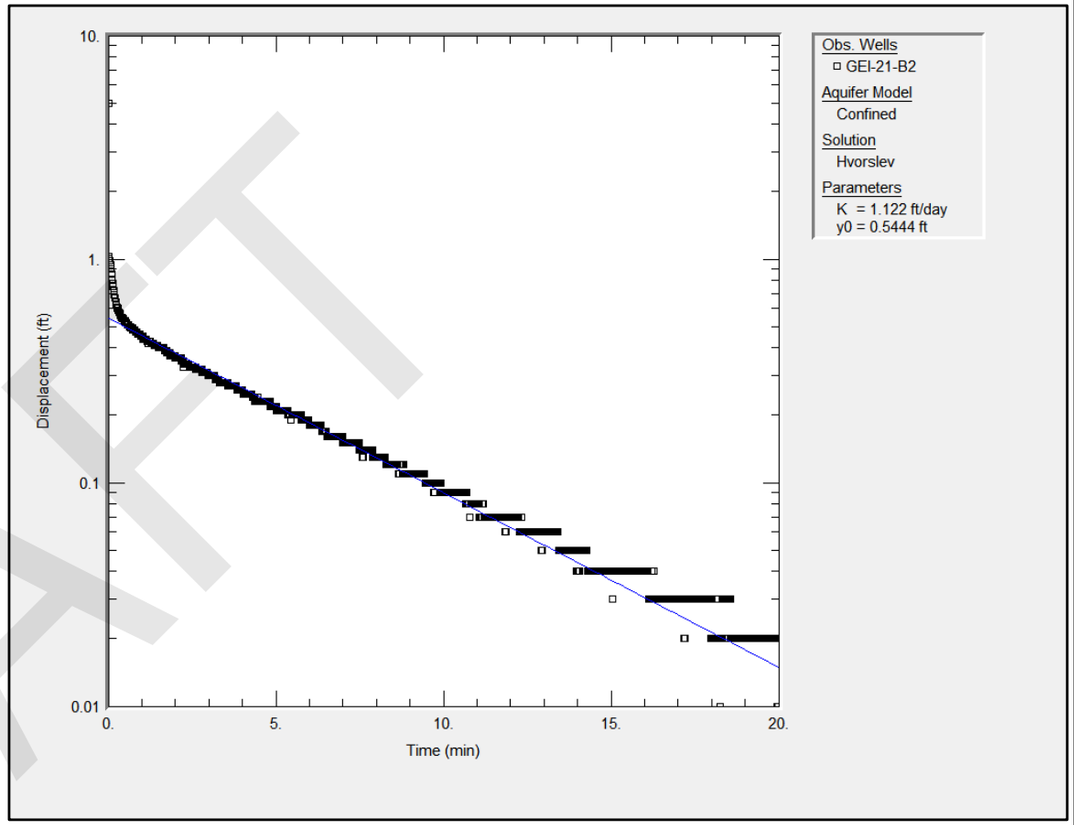
Figure D-10

00353-021-00: 11/22/21





Notes:
1. Approx. ground surface = Elev. 199 ft (NGVD29)
2. Static groundwater = 5.02 ft bgs (Elev. 194.0 ft) on 11/2/21
3. Well screen = 5-15 ft bgs

Slug Test Interpretation – Falling Head Test #1
Well B-2

City of Lacey – Lift Station 3 Replacement
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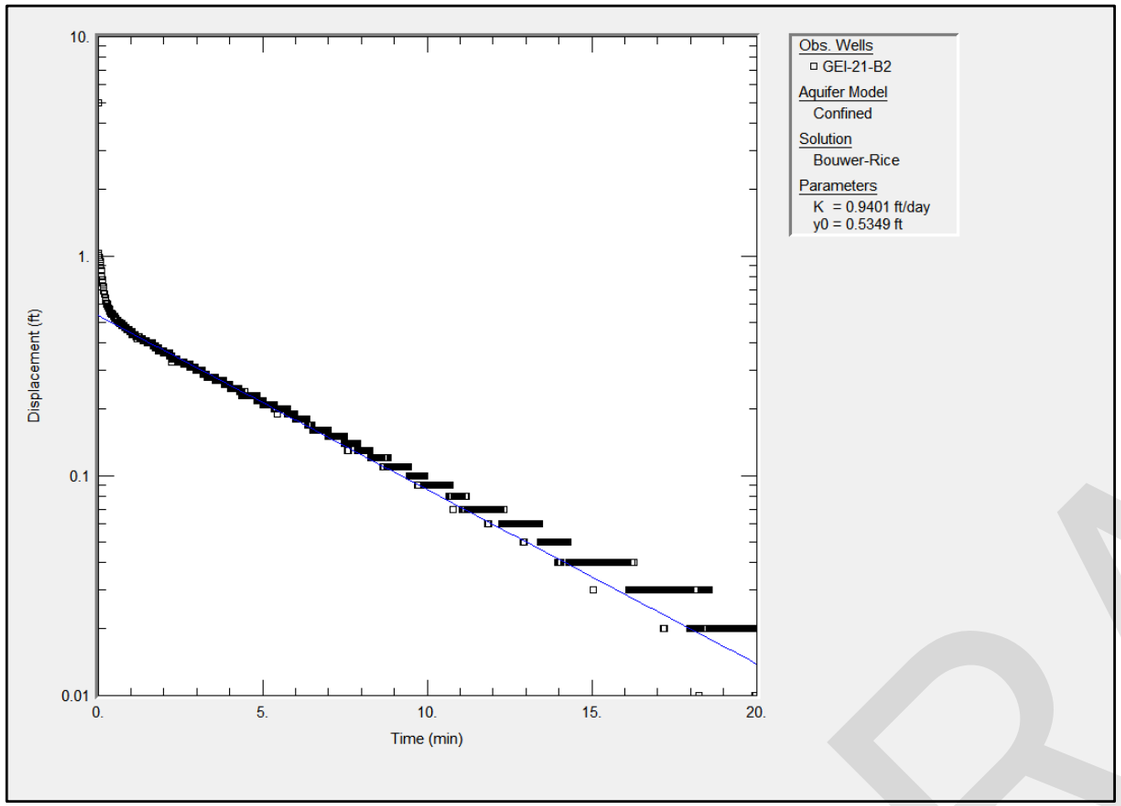
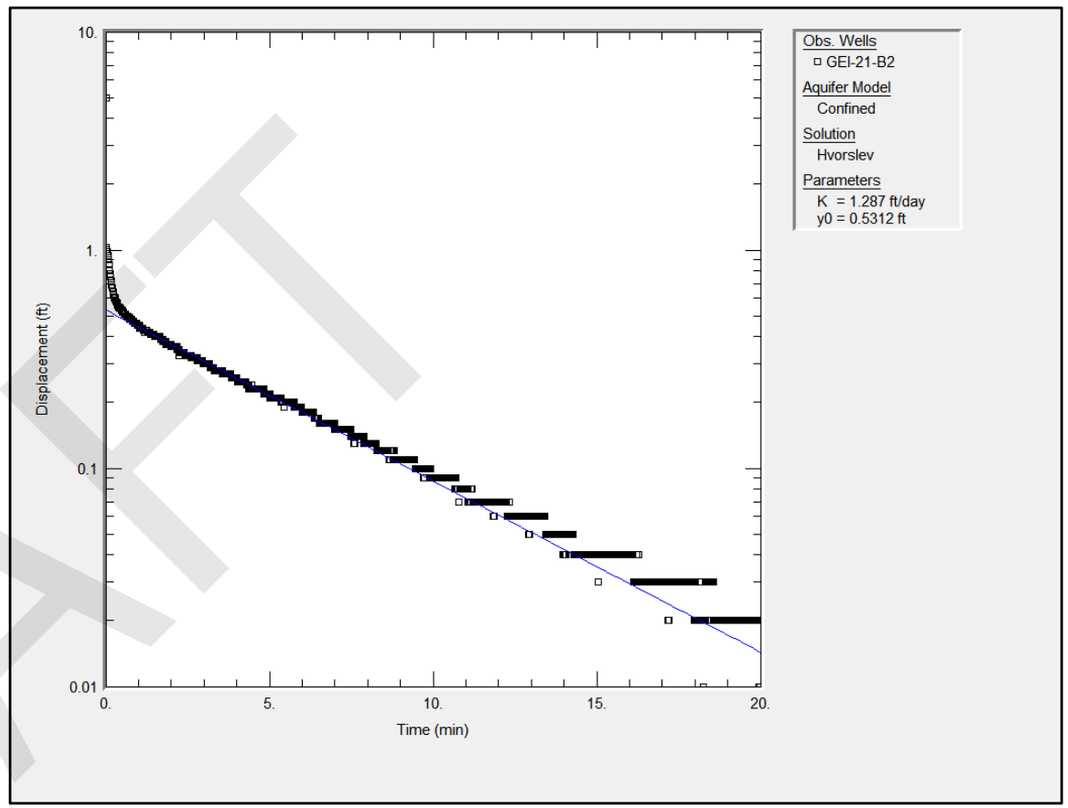
Figure D-11

00353-021-00: 11/22/21





Notes:
1. Approx. ground surface = Elev. 199 ft (NGVD29)
2. Static groundwater = 5.02 ft bgs (Elev. 194.0 ft) on 11/2/21
3. Well screen = 5-15 ft bgs

Slug Test Interpretation – Rising Head Test #1
Well B-2

City of Lacey – Lift Station 3 Replacement
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Figure D-12

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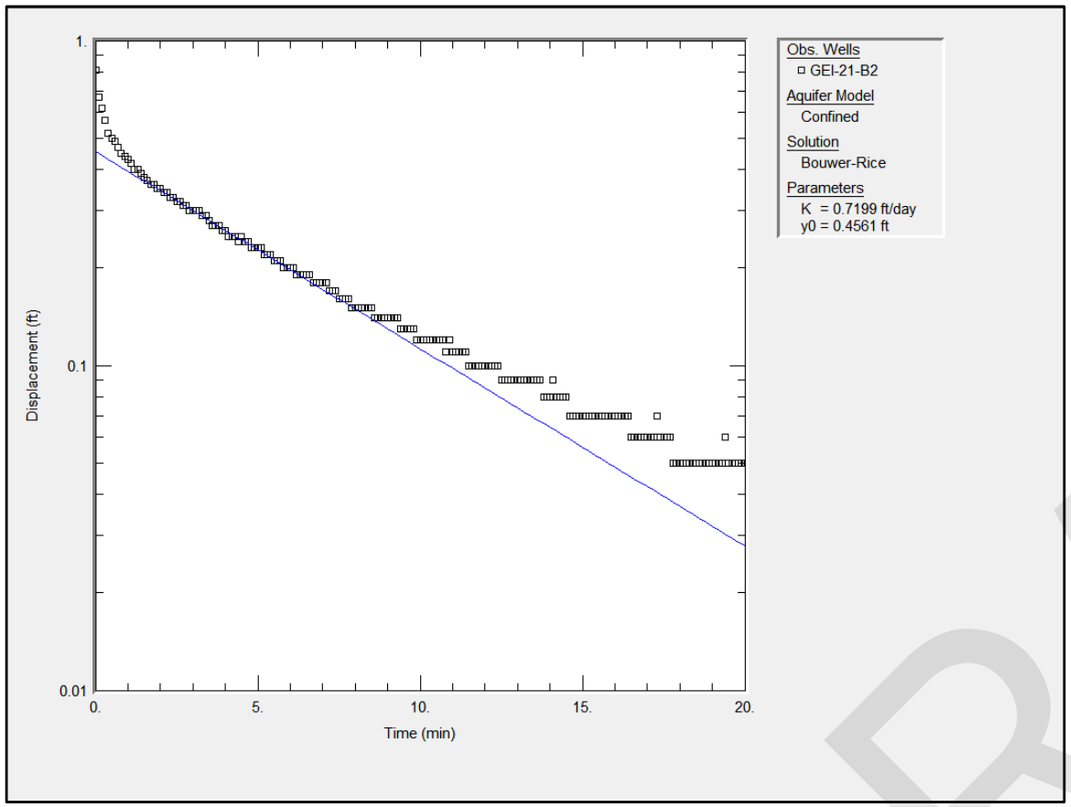

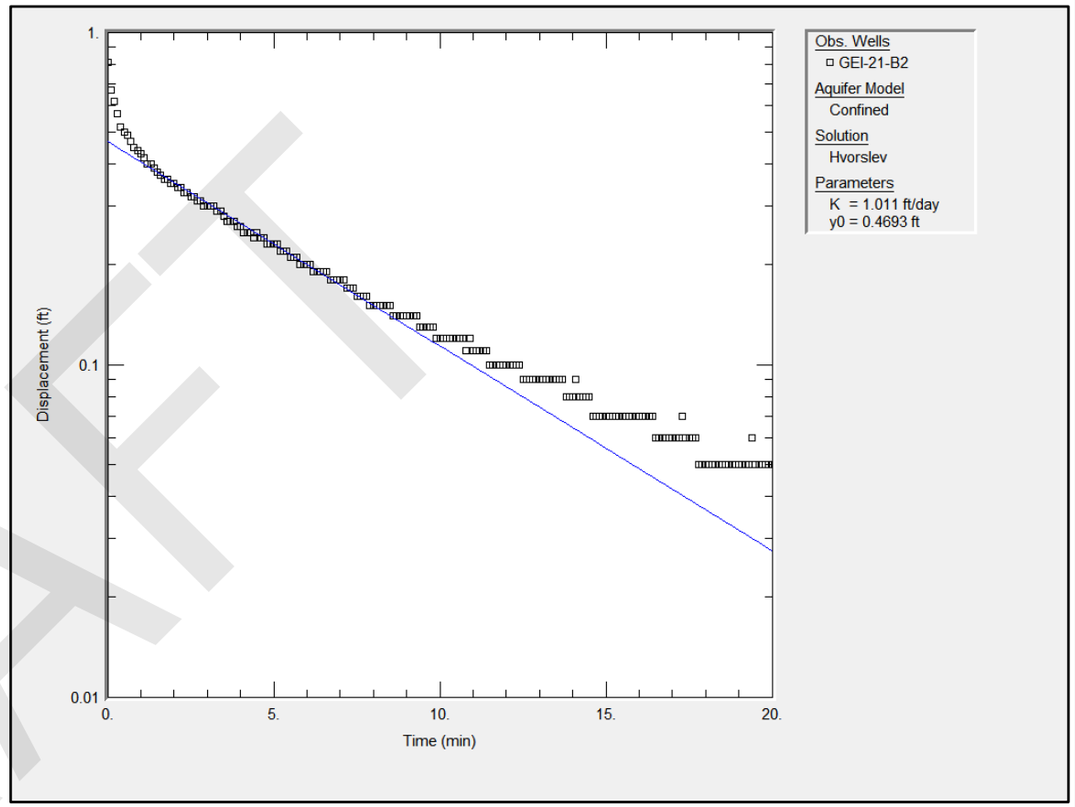

Notes:
1. Approx. ground surface = Elev. 199 ft (NGVD29)
2. Static groundwater = 5.02 ft bgs (Elev. 194.0 ft) on 11/2/21
3. Well screen = 5-15 ft bgs

Slug Test Interpretation – Falling Head Test #2
Well B-2

City of Lacey – Lift Station 3 Replacement
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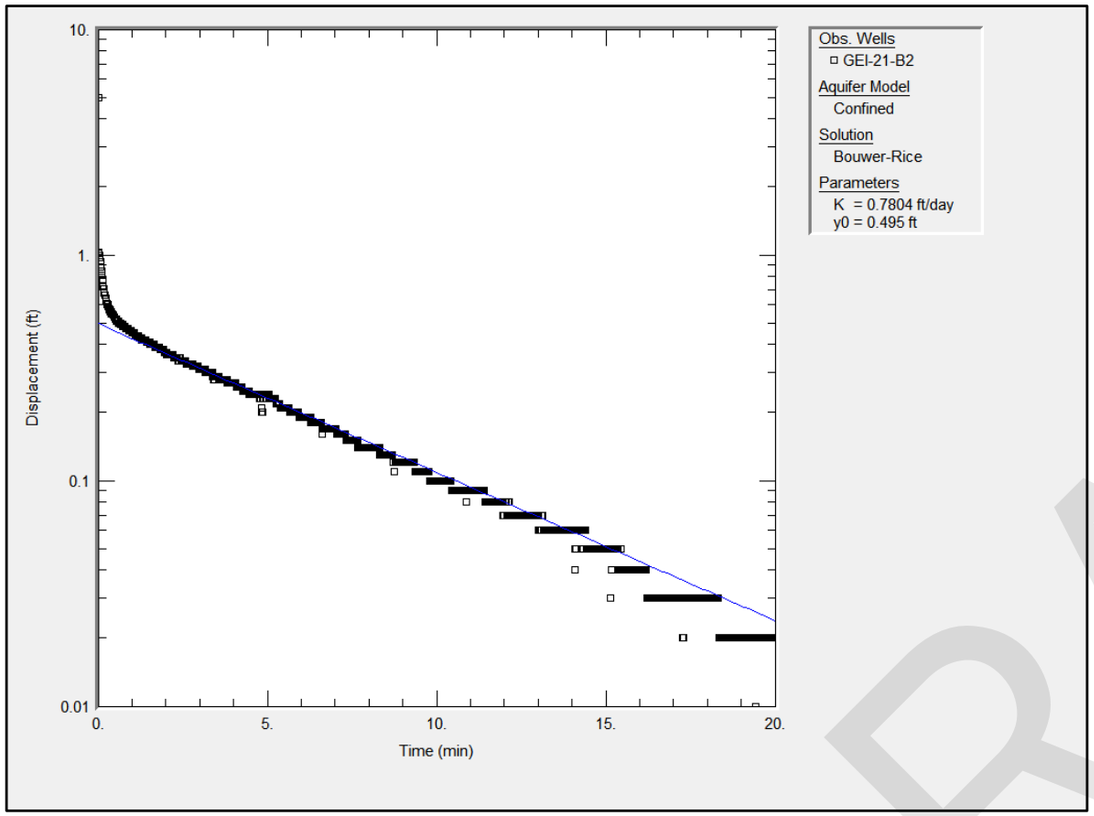
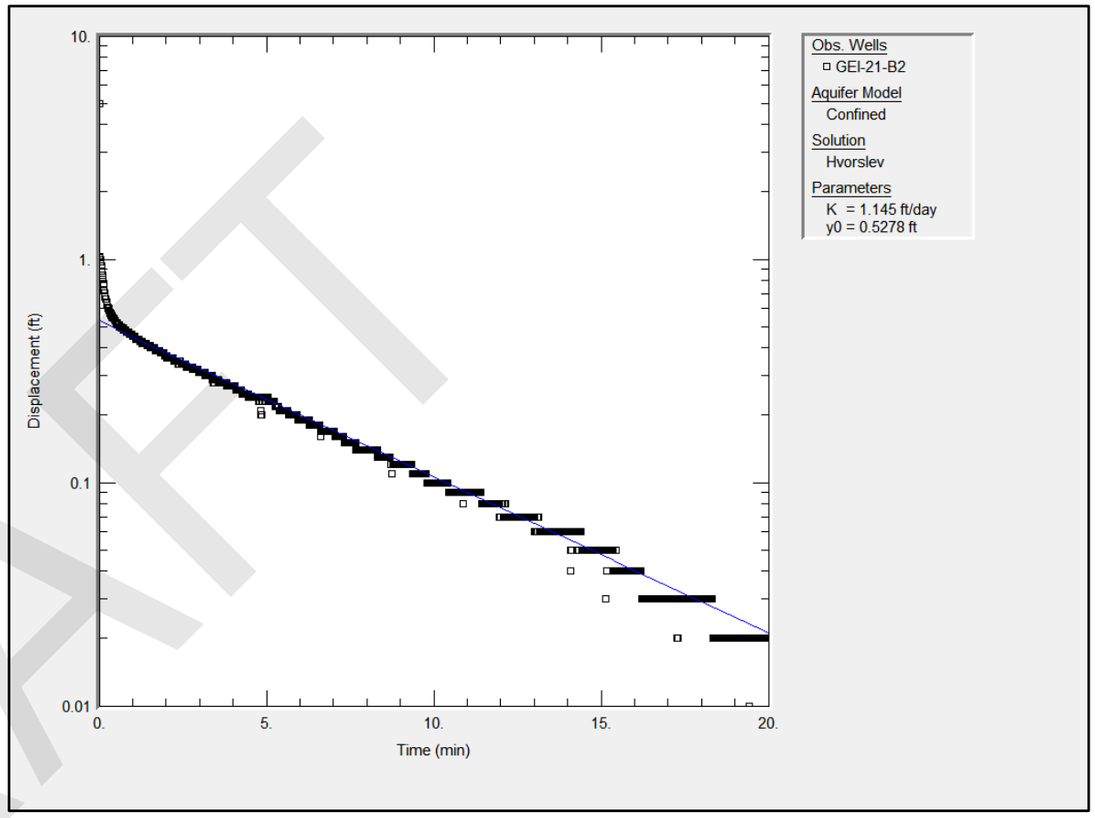
Figure D-13

00353-021-00: 11/22/21





Notes:
1. Approx. ground surface = Elev. 199 ft (NGVD29)
2. Static groundwater = 5.02 ft bgs (Elev. 194.0 ft) on 11/2/21
3. Well screen = 5-15 ft bgs

Slug Test Interpretation – Rising Head Test #2
Well B-2

City of Lacey – Lift Station 3 Replacement
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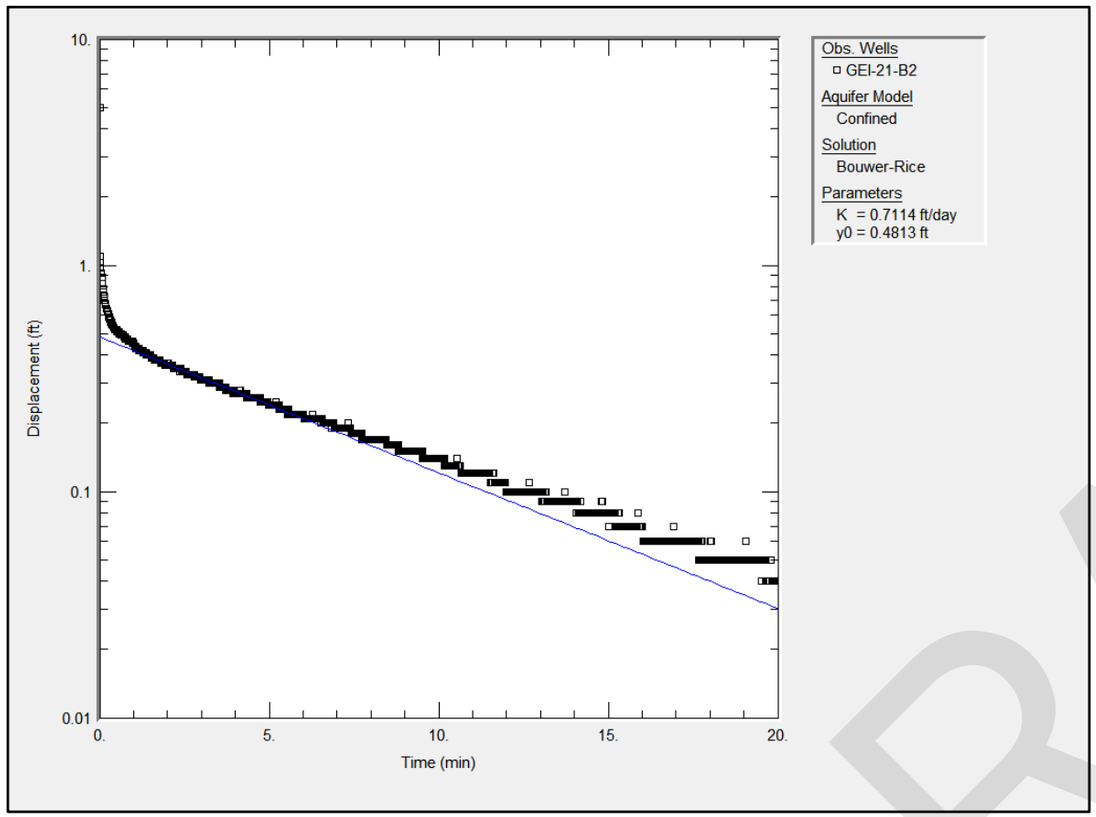
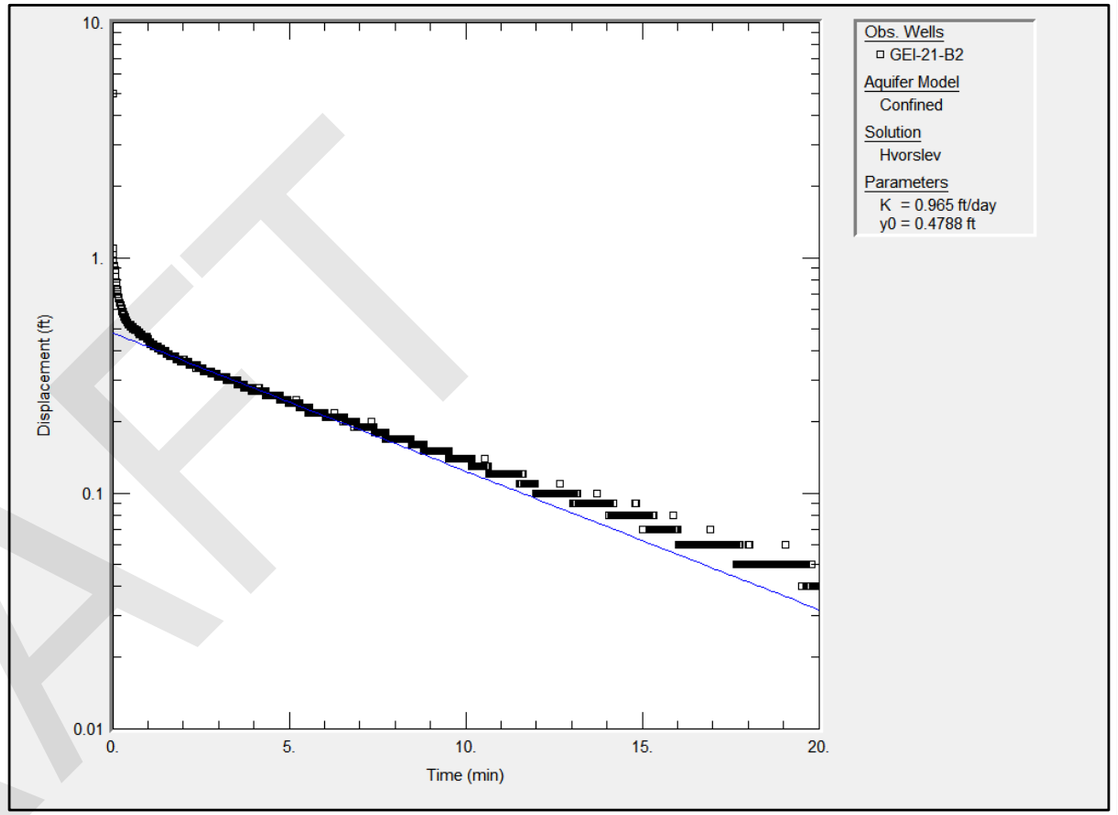
Figure D-14

00353-021-00: 11/22/21





Notes:
1. Approx. ground surface = Elev. 199 ft (NGVD29)
2. Static groundwater = 5.02 ft bgs (Elev. 194.0 ft) on 11/2/21
3. Well screen = 5-15 ft bgs

Slug Test Interpretation – Falling Head Test #3
Well B-2

City of Lacey – Lift Station 3 Replacement
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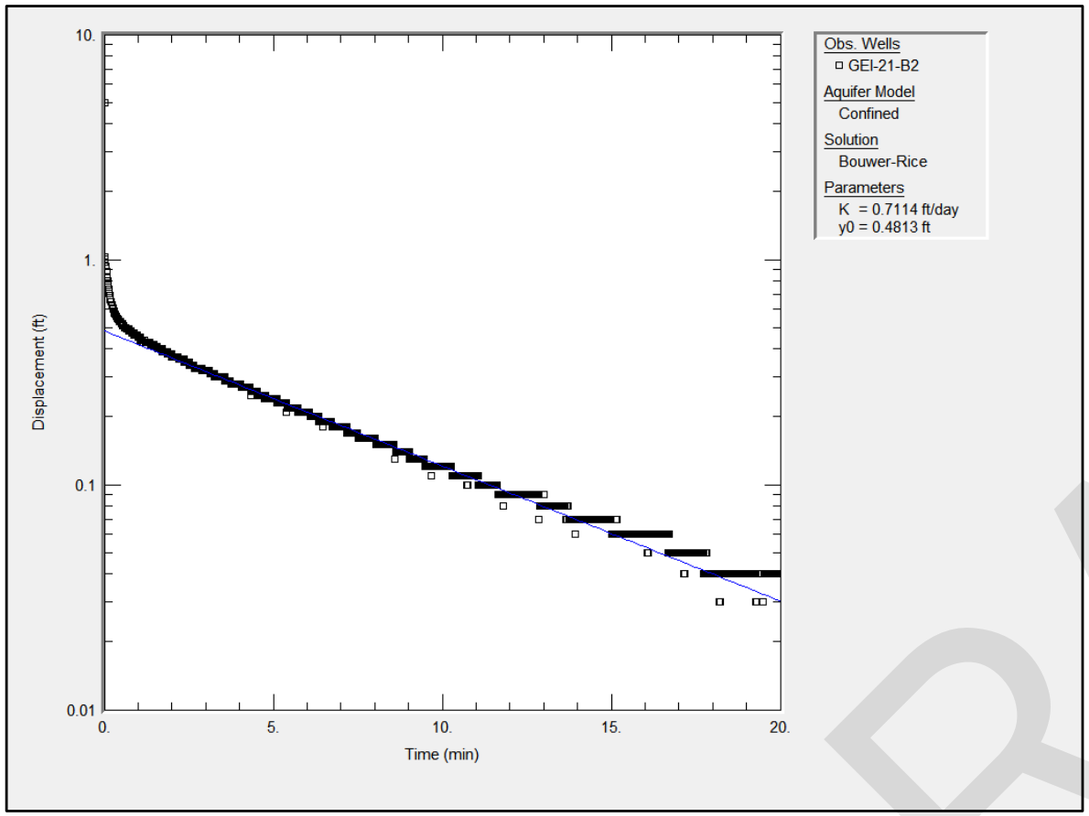
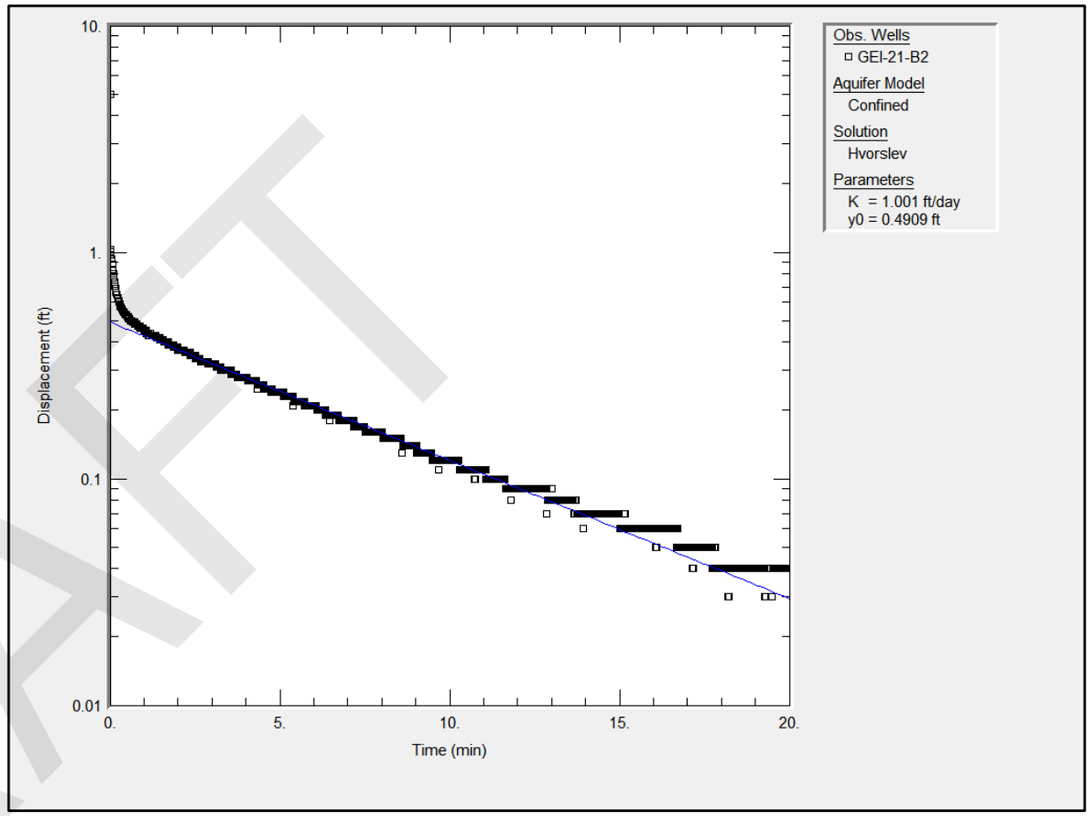
Figure D-15

00353-021-00: 11/22/21





Notes:
1. Approx. ground surface = Elev. 199 ft (NGVD29)
2. Static groundwater = 5.02 ft bgs (Elev. 194.0 ft) on 11/2/21
3. Well screen = 5-15 ft bgs

Slug Test Interpretation – Rising Head Test #3
Well B-2

City of Lacey – Lift Station 3 Replacement
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Figure D-16

00353-021-00: 11/22/21

APPENDIX E
Dewatering Analysis

APPENDIX E
DEWATERING ANALYSIS

Overview

This appendix summarizes our preliminary dewatering analysis for the planned excavations at Lift Station #3 and the associated force main replacement. Note: this analysis is not a formal dewatering system design; moreover, it is intended to provide an estimate of likely groundwater inflows and drawdowns for a range of hydrogeologic conditions and construction options. We performed the analysis using two approaches:

- An analytical method using the equation for a rectangular excavation presented in Powers.
- A numerical method using the three-dimensional (3D) code MODFLOW-NWT (Niswonger et al. 2011).

Conceptual Groundwater Conditions

Our analysis was formulated on a conceptual groundwater understanding that was based on a combination of (1) published hydrogeologic information for the project area, and (2) site specific soil and groundwater data from our exploration program conducted in September-November 2021.

The borings for monitoring wells B-1 and B-2 extended to 51½ feet below the ground surface (bgs); the saturated soils encountered consist of glacial recessional outwash (silts-sand-gravels). As the underlying regional glacial till unit was not encountered, we assume for the purpose of this dewatering assessment that the outwash has a saturated thickness of 51 feet. Slug tests completed in shallow wells B-1 and B-2 (see Appendix C) indicate that the average hydraulic conductivity of the upper part of the outwash is zone is between 0.9 and 23 feet per day (ft/day), or equivalent to 3.3×10^{-4} and 7.8×10^{-3} centimeters per second (cm/sec). The interpretation of grain size data for 10 soil samples collected from 2½ to 41 feet bgs in the two borings indicate a bulk permeability of between 0.4 and 640 ft/day (1.5×10^{-4} and 6.9×10^{2} cm/sec). However, most of the results are within the range of 1.7 and 58 ft/d.

In summary, for the purpose of the dewatering analysis:

- The upper aquifer is recessional outwash extending from ground surface (Elevation 199 feet) to 145 feet.
- The design groundwater level is Elevation 196 feet; the aquifer has a saturated thickness of 51 feet.
- The aquifer has a horizontal hydraulic conductivity (Kh) between 5 and 25 ft/day and vertical hydraulic conductivity (Kh) between 0.5 and 2.5 ft/day.
- Size of excavation: (a) 20 feet long by 20 feet wide by 25 feet deep (to Elevation 174 feet); and (b) 50 feet long by 50 feet wide by 25 feet deep.
- Required drawdown is 23 feet (from Elevation 196 feet to Elevation 173 feet).
- For the numerical approach, a distance to Chambers Lake recharge boundary of 300 feet.
- For the analytical approach, the aquifer has a specific yield of 0.25 (25 percent).
- The aquifer is uniform and homogeneous in terms of hydraulic properties and thickness, and the static water table is flat across the site and surrounding area.

The numerical model occupied a 1,000-foot by 1,000-foot area centered on the project site and uses computational cells as small at 5 foot by 5 foot in plan at the site (Figure E-1). The model extends from ground surface to Elevation 145 feet (Figure E-2).

Analytical Method Results

The analytical dewatering results are as follows:

Case	Aquifer Base (EL. Ft)	20-ft x 20-ft Excavation (gpm)		50-ft x 50-ft Excavation (gpm)	
		7 days	28 days[1]	7 days	28 days[1]
Low Kh	145	60	50	90	65
High Kh	145	235	195	320	250
	125	340	280	450	360

Note: 1 - approximately at steady-state.

Numerical Method Results

Figures E-3 through E-6 show the model-predicted groundwater contours for numerical model approach. The predicted steady-state dewatering rates are below:

Case	Aquifer Base (El. Ft)	20-ft x 20-ft Excavation (gpm)		50-ft x 50-ft Excavation (gpm)	
		No Shoring	Partial Shoring	No Shoring	Partial Shoring
Low Kh	145	40	60	60	70
High Kh	145	280	290	350	360
	125	330	390	440	450

Notes:1-impermeable shoring extends to EL. 150-155 ft. All wells are outside the excavation/shoring.

Overall, the results indicate that the expected steady-state dewatering rates could range up to 100 gallons per minute (gpm) for the low permeability and up to 360 gpm for the high permeability cases.

Dewatering and Shoring Considerations

Dewatering will be required if the shoring system is pervious (e.g., slide rail, or solder-pile and lagging). As the required drawdown at the lift station will not exceed the depth to the base of the aquifer zone, dewatering wells should be effective in achieving the dewatering goals.

Dewatering wells could be installed around the lift station to intercept and remove groundwater flowing within the aquifer zone. We recommend installing four wells external to the shoring and pumping these continuously throughout excavation and construction. Wells will likely require up to 40 feet of screen, the base of the screen located at or just below the basal contact with glacial till. The well and pump capacity should be at least 100 gpm for each installation in case higher permeability materials are present than revealed by the slug tests.

Vacuum wellpoints are an alternative dewatering method to deep wells. However, the drawdown they can achieve is limited by the amount of vacuum suction head that can be delivered to each wellpoint. The maximum suction head is 34 feet but this cannot usually be achieved in practice, with highly efficient vacuum wellpoint dewatering systems typically being limited to drawdowns of 15 to 20 feet bgs. Therefore, with a need to dewater to 25 feet bgs, we do not consider wellpoints would be effective.

Discharge Management

Depending on the means, methods and scheduling employed by the contractor, the peak groundwater pumping rates during the system start up and initial few days of dewatering may be 50 percent higher than the steady-state inflow rates we estimated above. Also, the initial period of discharge is likely to produce more turbid water than later; this initial water will likely have to be retained (e.g., in a Baker Tank) to provide time for suspended sediment to settle out as needed for the discharge water to meet permit limits prior to disposal. The contractor should anticipate the need for several tanks for temporary storage of pumped groundwater prior to final discharge.

Alternatives to Full Dewatering

Impervious shoring that extends below the planned depth of lift station excavation into the upper part of the glacial till unit would provide a cut-off to lateral and vertical groundwater inflow and alleviate the need for external dewatering of the shored excavation using dewatering wells. Based on the borings we drilled, the depth to effective hydraulic cut off could be between 35 and 50 feet. Options include sheet-pile shoring and a secant-pile wall.

Sheet-Pile Shoring as Seepage Cut-Off

Sheet piles driven into the underlying glacial till should provide an effective seepage cut-off limiting lateral inflow to incidental leakage through the sheet-pile clutches. However, driving sheet piles into very dense over consolidated glacial soils within a residential area may be problematic. Piles may reach refusal on cobbles or above the required toe depth. However, seepage inflows will be greatly reduced and should be manageable, with an internal sump. Sheet-pile shoring must be designed by an experienced and qualified professional engineer, taking account of the full external hydrostatic pressure loading provided by a design groundwater elevation at the ground surface.

Secant-Pile Wall as Seepage Cut-Off

Drilled secant piles could be used to create a circular excavation that is self-supporting and does not require bracing. Drilling for the installation of secant piles should remove most obstacles and enable adequate embedment into the glacial till, effectively cutting off lateral seepage flows. A secant-pile wall of adequate thickness with sufficient steel reinforcement must be designed by an experienced and qualified professional engineer, taking account of the full external hydrostatic pressure loading provided by a design groundwater elevation at the ground surface.

Caisson

An alternate method for constructing the lift station under high groundwater conditions is to install it as a caisson. This may be difficult to do in dense glacial soils as the caisson will be small and may not be heavy enough to descend under friction with the surrounding soils. Also, artesian conditions and the risk of a blow-out type basal failure may occur as the caisson approaches the top of the aquifer zone, likely requiring some dewatering to lower the groundwater pressure.

Artificial Ground Freezing

Ground freezing is a technique for temporary soil reinforcement that creates an ice-soil structure in the ground. The concept is to convert groundwater into ice. Freezing is achieved by circulation of liquid nitrogen or brine in closely spaced, closed pipes placed in the ground, or by a combination of both methods. Once the required level of freezing is achieved, excavation proceeds without the need for dewatering and, as such, groundwater treatment and disposal. Also, no cone of depression is created and the risk of drawdown-induced settlement is avoided. Freezing is mostly limited to low to moderately permeable soils with a low natural seepage velocity (termed the critical groundwater velocity, which is approximately 2 to 3 ft/day). Soil freezing is successful when completed by experienced contractors that have the required specialized equipment. It is an interactive process requiring advanced engineering, accurate drilling as well as custom made refrigeration and instrumentation equipment.

References

Niswonger, R.G., Panday, Sorab, and Ibaraki, Motomu, 2011, MODFLOW-NWT, A Newton formulation for MODFLOW-2005: U.S. Geological Survey Techniques and Methods 6-A37, 44 p., https://doi.org/10.3133/tm6A45.

Powers, J. Patrick P.E., Arthur B. Corwin P.E., Paul C. Schmall P.E., Walter E. Kaeck P.E., 2007. Construction Dewatering and Groundwater Control: New Methods and Applications, Third Edition.

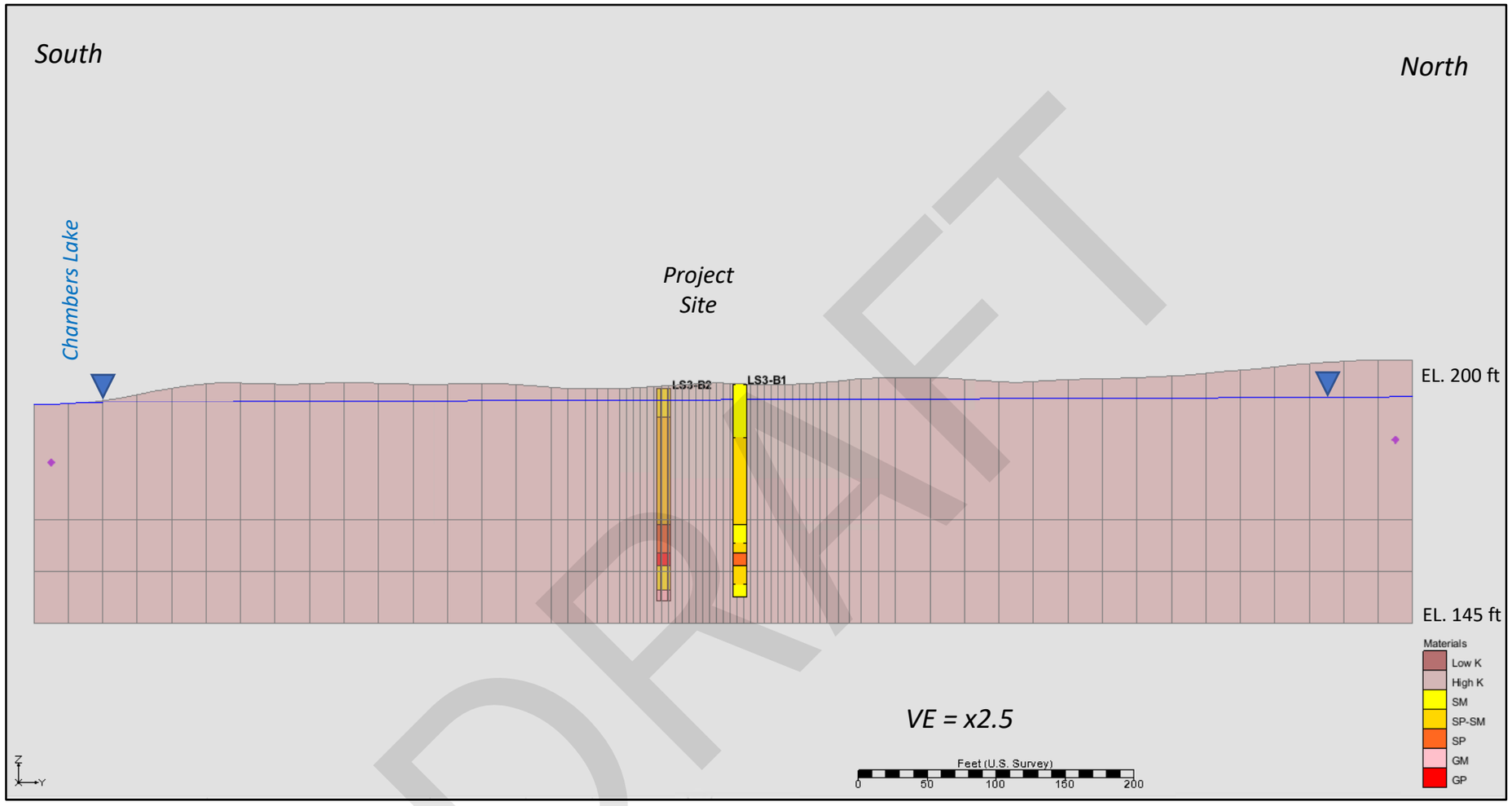
Dewatering Evaluation – Model Domain and Computational Mesh

City of Lacey – Lift Station 3 Replacement
Lacey, Washington

GeoEngineers

Figure E-1

00353-021-00: 11/22/21



Notes:
1. Approx. ground surface = Elev. 199 ft (NGVD29)

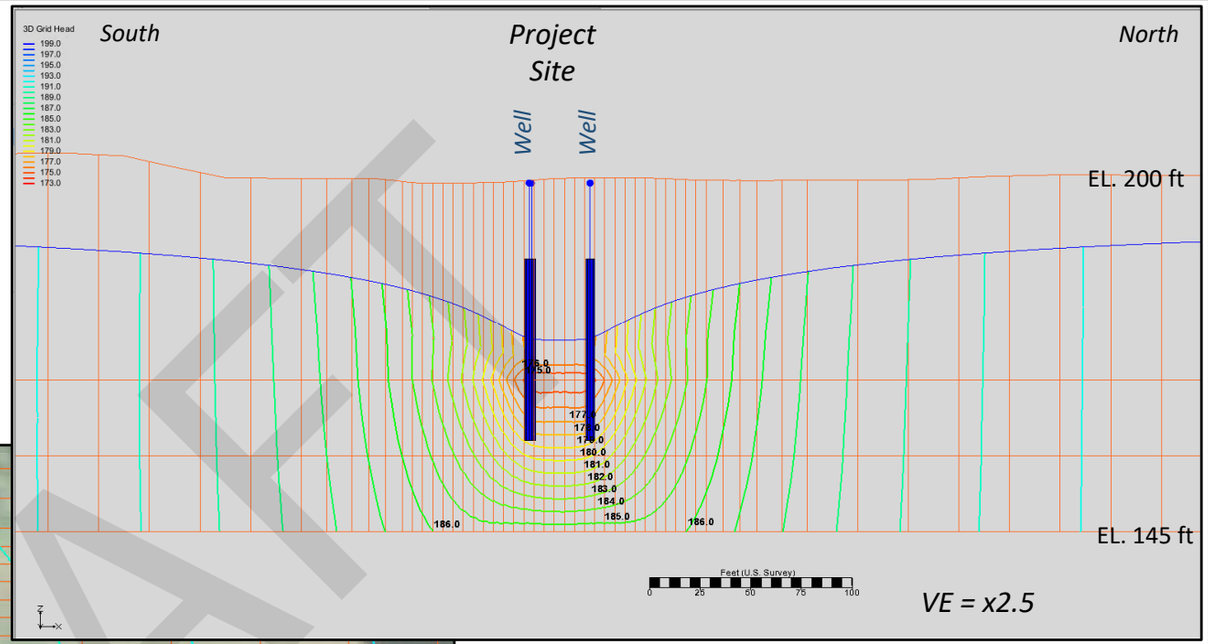
Dewatering Evaluation – Profile and Layering

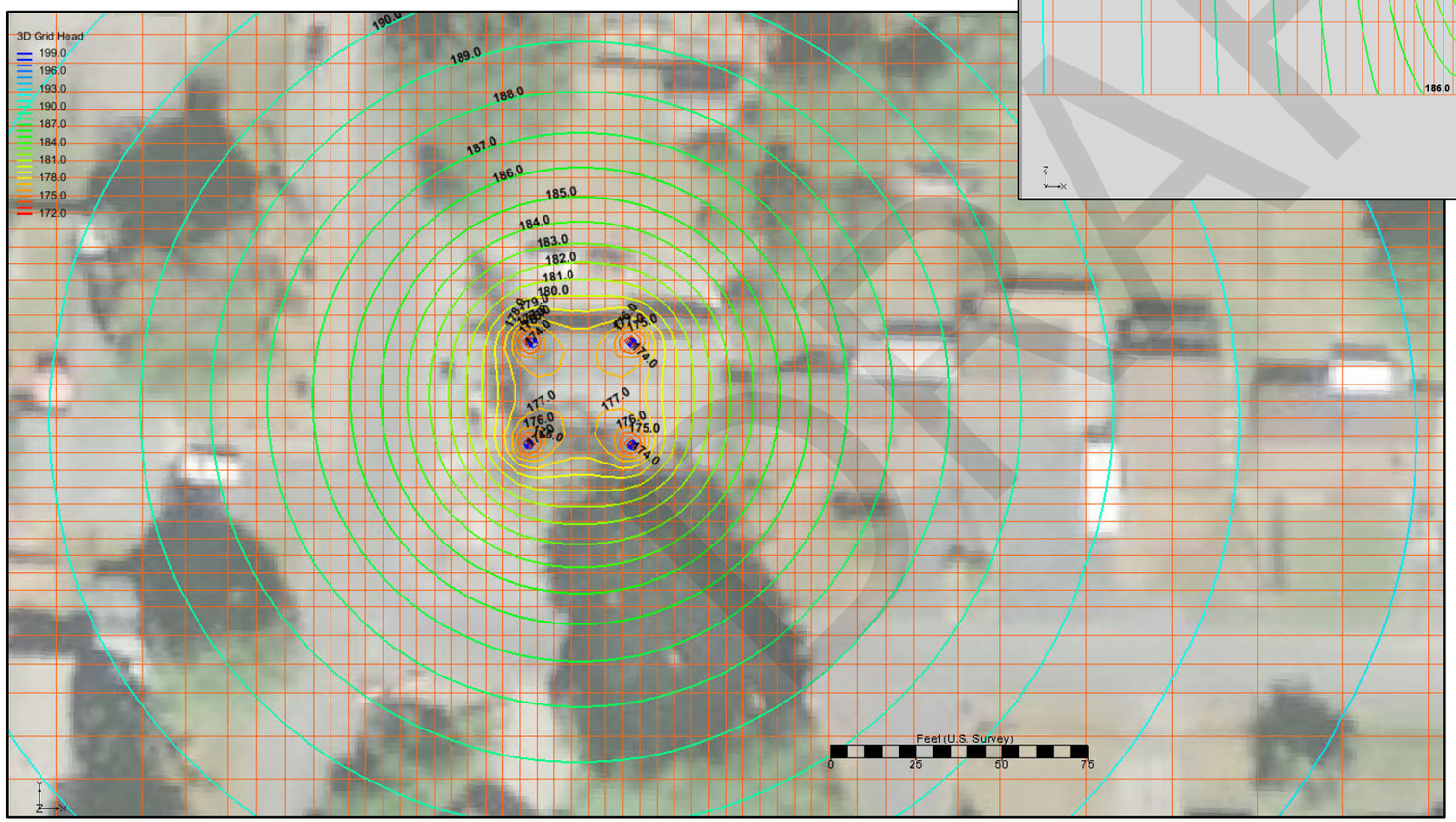
City of Lacey – Lift Station 3 Replacement
Lacey, Washington

GeoEngineers

Figure E-2

00353-021-00: 11/22/21





Notes:

1. Kh=25 ft/day, Kv = 2.5 ft/day
2. No shoring incorporated
3. Target drawdown to EL. 175 ft
4. Total pumping = 280 gpm

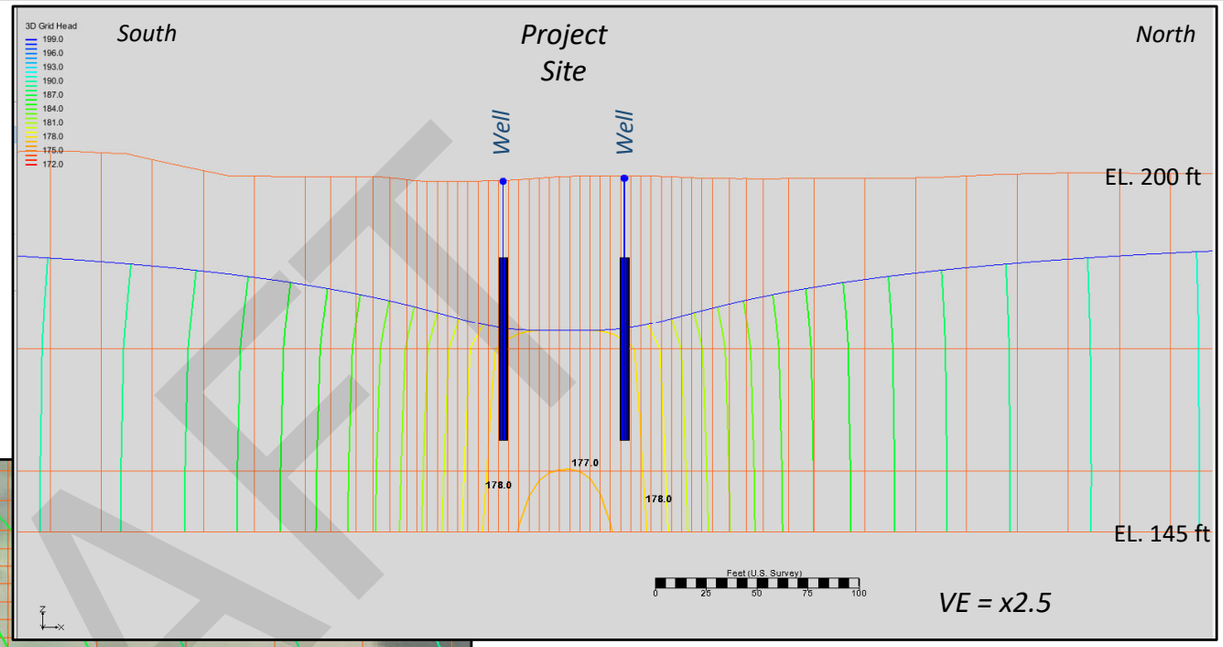
Dewatering Evaluation – Steady-state Contours (20' x 20' excavation)

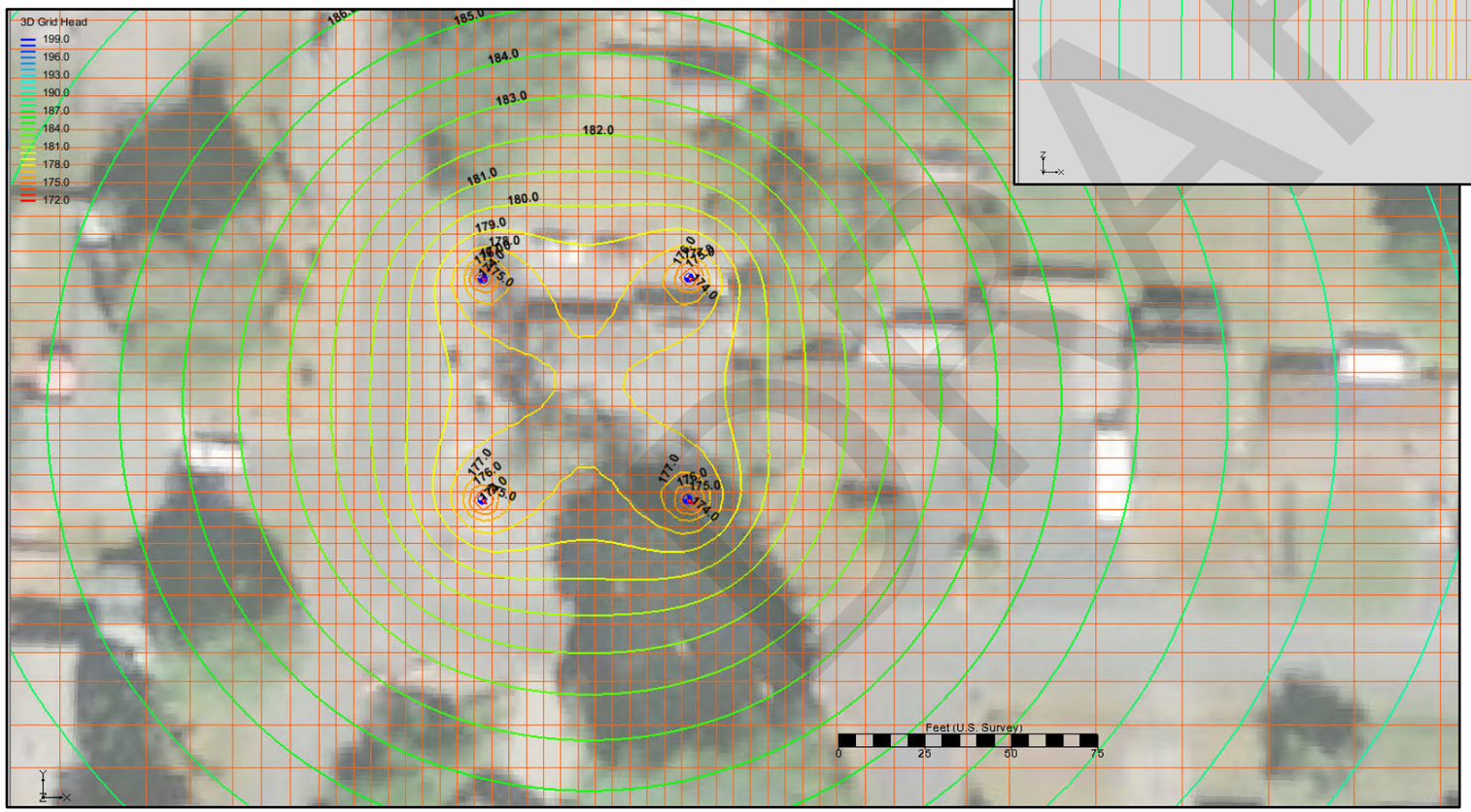
City of Lacey – Lift Station 3 Replacement
Lacey, Washington

GeoEngineers

Figure E-3

00353-021-00: 11/22/21





Notes:
1. Kh=25 ft/day, Kv = 2.5 ft/day
2. No shoring incorporated
3. Target drawdown to EL. 175 ft
4. Total pumping = 350 gpm

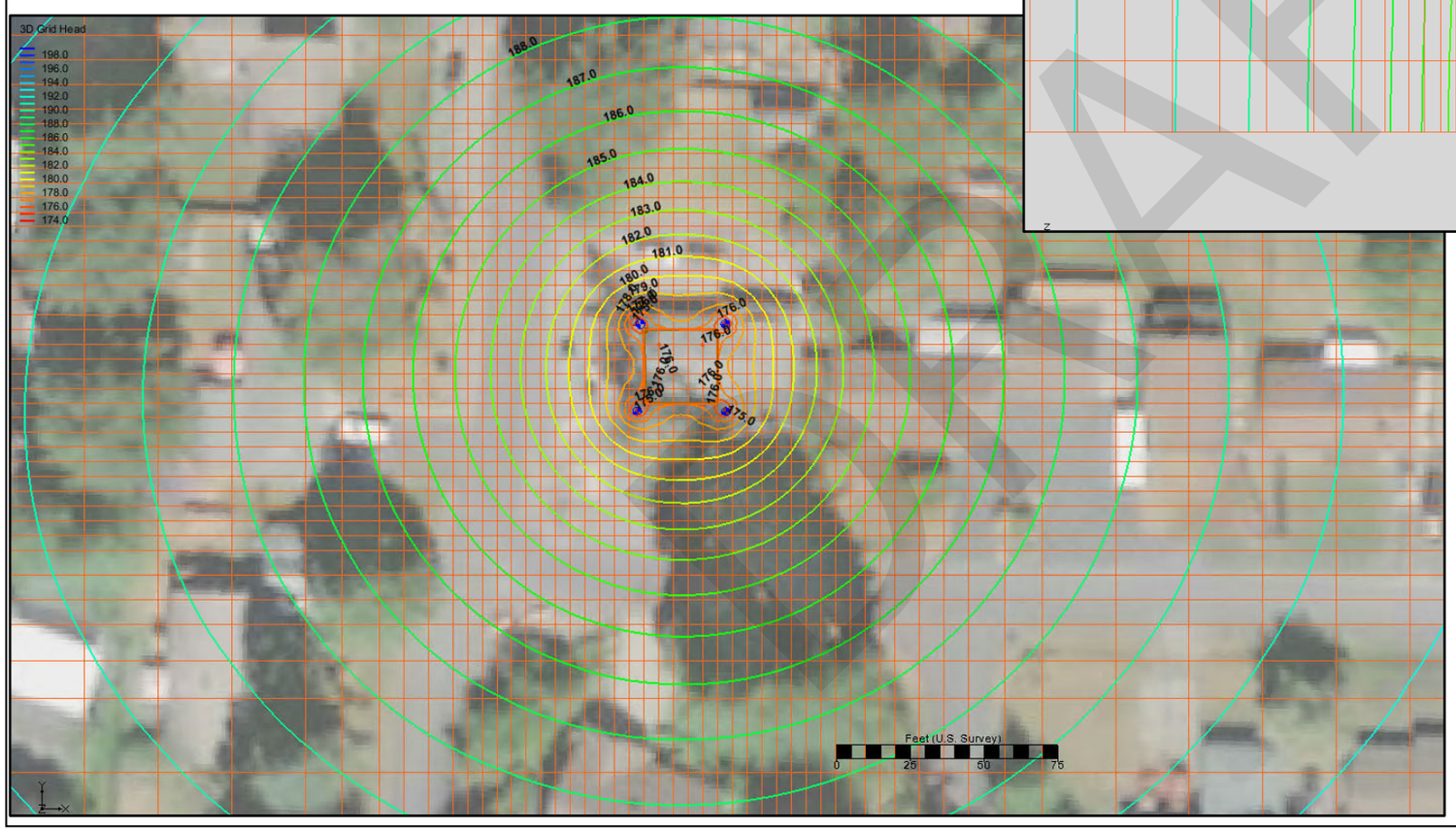
Dewatering Evaluation – Steady-state Contours (50' x 50' excavation)

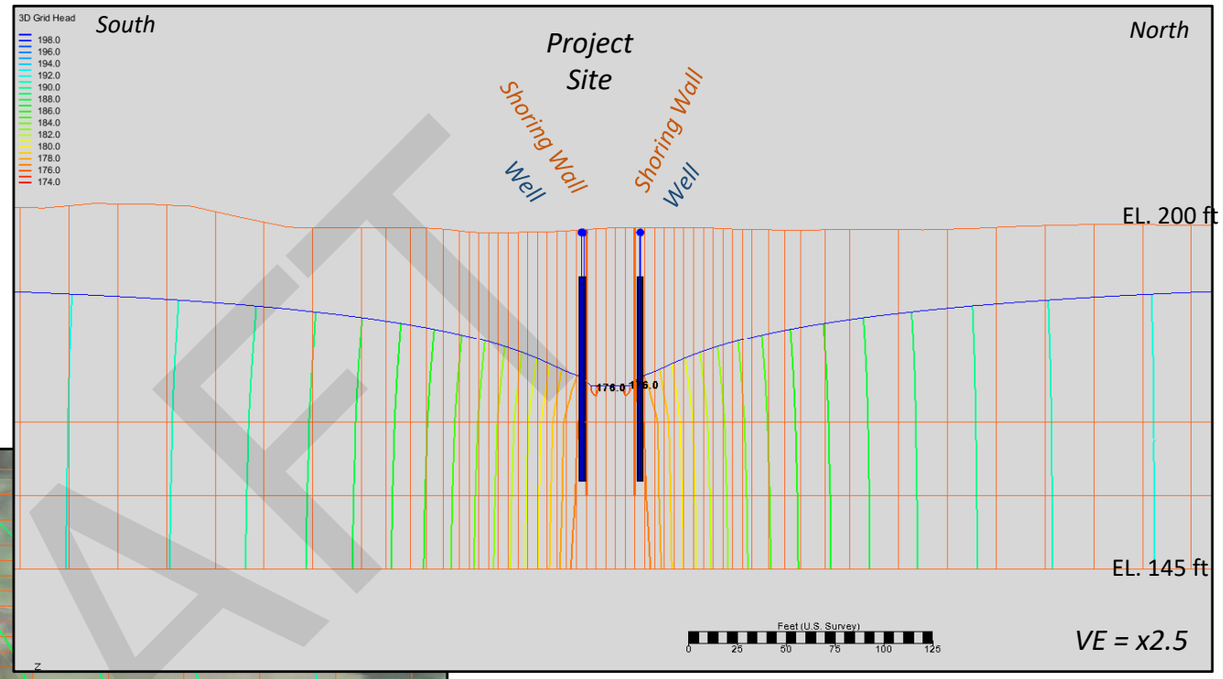
City of Lacey – Lift Station 3 Replacement
Lacey, Washington

GeoEngineers

Figure E-4

00353-021-00: 11/22/21





Notes:

1. Kh=25 ft/day, Kv = 2.5 ft/day
2. Shoring to EL. 157.5 ft
3. Target drawdown to EL. 175 ft
4. Total pumping = 290 gpm

Dewatering Evaluation – Steady-state Contours (20' x 20' shored excavation)

City of Lacey – Lift Station 3 Replacement
Lacey, Washington

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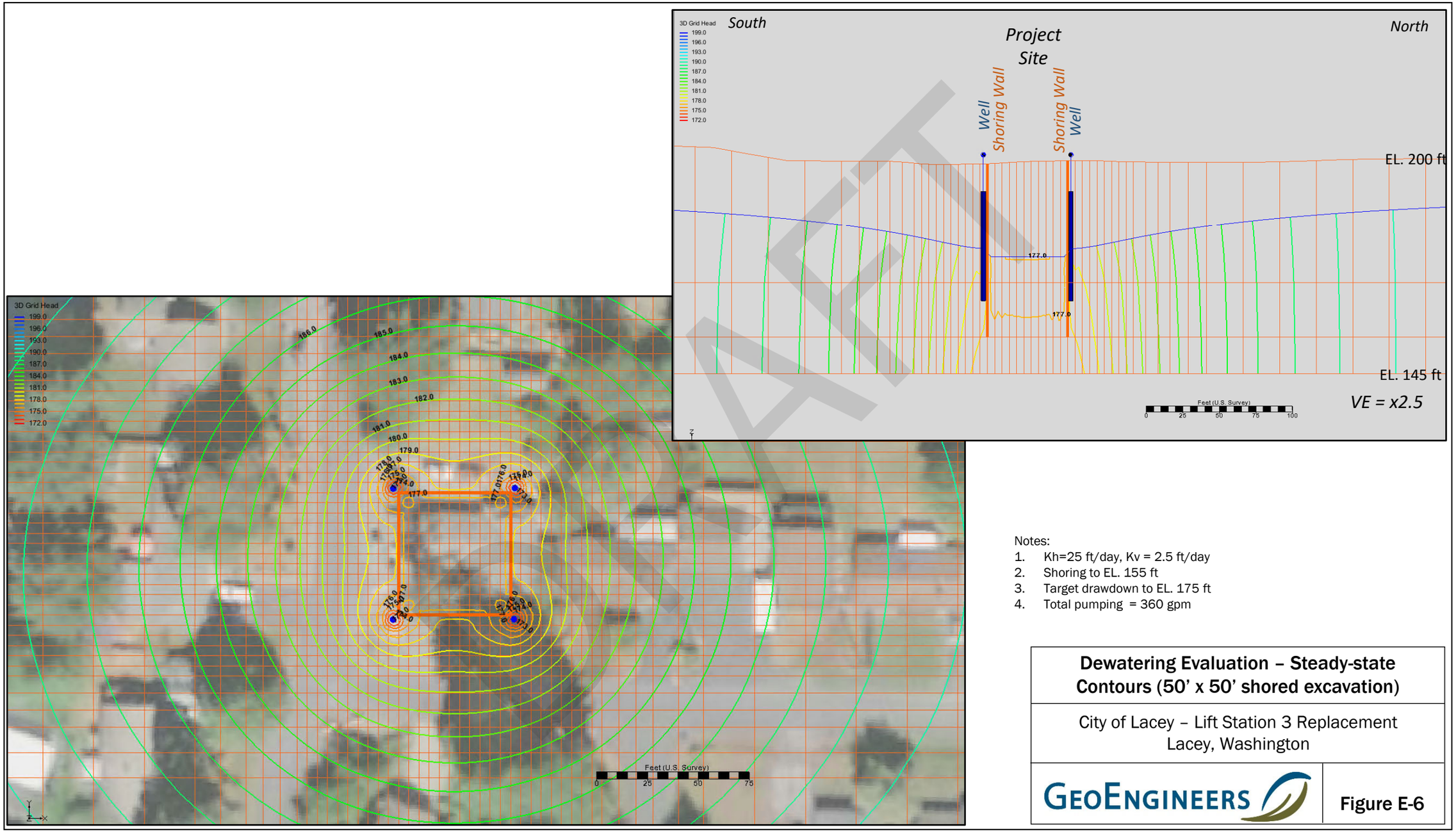
Figure E-5

00353-021-00: 11/22/21



Notes:

1. Kh=25 ft/day, Kv = 2.5 ft/day
2. Shoring to EL. 155 ft
3. Target drawdown to EL. 175 ft
4. Total pumping = 360 gpm

Dewatering Evaluation – Steady-state Contours (50' x 50' shored excavation)

City of Lacey – Lift Station 3 Replacement
Lacey, Washington

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Figure E-6

00353-021-00: 11/22/21

APPENDIX F
Report Limitations and Guidelines for Use

APPENDIX F
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Read These Provisions Closely

It is important to recognize that the geoscience practices (geotechnical engineering, geology and environmental science) rely on professional judgment and opinion to a greater extent than other engineering and natural science disciplines, where more precise and/or readily observable data may exist. To help clients better understand how this difference pertains to our services, GeoEngineers includes the following explanatory "limitations" provisions in its reports. Please confer with GeoEngineers if you need to know more how these "Report Limitations and Guidelines for Use" apply to your project or site.

Geotechnical Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for Murraysmith, Inc. for the Lift Station #3 Replacement project in Lacey, Washington. The information contained herein is not applicable to other sites or projects.

GeoEngineers structures its services to meet the specific needs of its clients. No party other than the party to whom this report is addressed may rely on the product of our services unless we agree to such reliance in advance and in writing. Within the limitations of the agreed scope of services for the Lift Station #3 Replacement project, and its schedule and budget, our services have been executed in accordance with our agreement with Murraysmith, Inc. dated April 30, 2021 and executed on July 14, 2021, and generally accepted geotechnical practices in this area at the time this report was prepared. We do not authorize, and will not be responsible for, the use of this report for any purposes or projects other than those identified in the report.

A Geotechnical Engineering or Geologic Report is based on a Unique Set of Project-Specific Factors

This report has been prepared for the Lift Station #3 Replacement project in Lacey, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, it is important not to rely on this report if it was:

- Not prepared for you,
- Not prepared for your project,
- Not prepared for the specific site explored, or
- Completed before important project changes were made.

For example, changes that can affect the applicability of this report include those that affect:

- The function of the proposed structure;

1 Developed based on material provided by GBA, GeoProfessional Business Association; www.geoprofessional.org.

- Elevation, configuration, location, orientation or weight of the proposed structure;
- Composition of the design team; or
- Project ownership.

If changes occur after the date of this report, GeoEngineers cannot be responsible for any consequences of such changes in relation to this report unless we have been given the opportunity to review our interpretations and recommendations. Based on that review, we can provide written modifications or confirmation, as appropriate.

Environmental Concerns are Not Covered

Unless environmental services were specifically included in our scope of services, this report does not provide any environmental findings, conclusions, or recommendations, including but not limited to, the likelihood of encountering underground storage tanks or regulated contaminants.

Subsurface Conditions Can Change

This geotechnical or geologic report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by man-made events such as construction on or adjacent to the site, new information or technology that becomes available subsequent to the report date, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. If more than a few months have passed since issuance of our report or work product, or if any of the described events may have occurred, please contact GeoEngineers before applying this report for its intended purpose so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Geotechnical and Geologic Findings are Professional Opinions

Our interpretations of subsurface conditions are based on field observations from widely spaced sampling locations at the site. Site exploration identifies the specific subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied its professional judgment to render an informed opinion about subsurface conditions at other locations. Actual subsurface conditions may differ, sometimes significantly, from the opinions presented in this report. Our report, conclusions and interpretations are not a warranty of the actual subsurface conditions.

Geotechnical Engineering Report Recommendations are Not Final

We have developed the following recommendations based on data gathered from subsurface investigation(s). These investigations sample just a small percentage of a site to create a snapshot of the subsurface conditions elsewhere on the site. Such sampling on its own cannot provide a complete and accurate view of subsurface conditions for the entire site. Therefore, the recommendations included in this report are preliminary and should not be considered final. GeoEngineers' recommendations can be finalized only by observing actual subsurface conditions revealed during construction. GeoEngineers cannot assume responsibility or liability for the recommendations in this report if we do not perform construction observation.

We recommend that you allow sufficient monitoring, testing and consultation during construction by GeoEngineers to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes if the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork activities are completed in accordance with our recommendations. Retaining GeoEngineers for construction observation for this project is the most effective means of managing the risks associated with unanticipated conditions. If another party performs field observation and confirms our expectations, the other party must take full responsibility for both the observations and recommendations. Please note, however, that another party would lack our project-specific knowledge and resources.

A Geotechnical Engineering or Geologic Report Could Be Subject to Misinterpretation

Misinterpretation of this report by members of the design team or by contractors can result in costly problems. GeoEngineers can help reduce the risks of misinterpretation by conferring with appropriate members of the design team after submitting the report, reviewing pertinent elements of the design team's plans and specifications, participating in pre-bid and preconstruction conferences, and providing construction observation.

Do Not Redraw the Exploration Logs

Geotechnical engineers and geologists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. The logs included in a geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design drawings. Photographic or electronic reproduction is acceptable but separating logs from the report can create a risk of misinterpretation.

Give Contractors a Complete Report and Guidance

To help reduce the risk of problems associated with unanticipated subsurface conditions, GeoEngineers recommends giving contractors the complete geotechnical engineering or geologic report, including these "Report Limitations and Guidelines for Use." When providing the report, you should preface it with a clearly written letter of transmittal that:

- Advises contractors that the report was not prepared for purposes of bid development and that its accuracy is limited; and
- Encourages contractors to conduct additional study to obtain the specific types of information they need or prefer.

Contractors are Responsible for Site Safety on Their Own Construction Projects

Our geotechnical recommendations are not intended to direct the contractor's procedures, methods, schedule or management of the work site. The contractor is solely responsible for job site safety and for managing construction operations to minimize risks to on-site personnel and adjacent properties.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants, and no conclusions or inferences should be drawn regarding Biological Pollutants as

they may relate to this project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria and viruses, and/or any of their byproducts.

A Client that desires these specialized services is advised to obtain them from a consultant who offers services in this specialized field.

Information Provided by Others

GeoEngineers has relied upon certain data or information provided or compiled by others in the performance of our services. Although we use sources that we reasonably believe to be trustworthy, GeoEngineers cannot warrant or guarantee the accuracy or completeness of information provided or compiled by others.

Attachment 4

Maintenance and Source Control Manual

Attachment 4

Maintenance and Source Control Manual

1.1 Project Description

This is the Maintenance and Source Control Manual for the City of Lacey (City) Lift Station Number 3 Replacement Project (project). The existing Lift Station 3 (LS3) is located in the public right-of-way at the northeast corner of Golf Club Road SE and 26th Avenue SE in Lacey, Washington. The project will relocate LS3 to the property directly east of the existing station, at 4406 SE 26th Avenue, Lacey, Washington. The project will include the construction of an underground wet well and valve vault, along with drive-through vehicular access, a control building with ADA bathroom, generator and fuel tank, and a 15-foot landscape buffer along the eastern edge of the property.

Stormwater enters the site primarily through rainfall; the surrounding topography is relatively flat and creates no significant run-on. Stormwater from the 450 square feet (sf) control building roof will be collected in gutters and managed through downspout infiltration. Grading of the 6,400 sf non-roof impervious surfaces will allow sheet flow dispersion to nearby existing stormwater structures. The remaining 2,700 sf of the project site is pervious and will conform to postconstruction soil quality and depth standards per SWMMWW BMP T5.13.

Maintenance will not be required for the impervious area graded to allow sheet flow dispersion nor postconstruction soil quality and depth. Maintenance requirements for downspout infiltration are discussed further in Section 1.4.

1.2 Maintenance Importance and Intent

The importance of maintenance for the proper functioning of stormwater control facilities cannot be over-emphasized. A substantial portion of failures (clogging of filters, resuspension of sediments, loss of storage capacity, etc.) are due to inadequate maintenance. Stormwater BMP maintenance is essential to ensure that BMPs function as intended throughout their full life cycle.

The fundamental goals of maintenance activities are to ensure the entire flow regime and treatment train designed for this site continue to fully function. For this site these include: maintain designed stormwater infiltration capacity; preserve soil and plant health, as well as stormwater flow contact with plant and soil systems; clearly identify systems so they can be protected; keep maintenance costs low; prevent large-scale or expensive stormwater system failures; and prevent water quality violations or damage to downstream properties.

The intent of this section and manual is to pass on to the responsible party(s) all the information critical to understand the design of the system, risks and considerations for proper use, suggestions for maintenance frequencies, and cost so that realistic budgets can be established.

1.3 Responsible Parties

The City of Lacey is the sole owner and operator of this project site and associated facilities.

1.4 Facilities Requiring Maintenance

The facility which requires maintenance is the downspout infiltration for the control building roof. The details of this structure are included with the plan set as Appendix A at the end of this report. Maintenance requirements are discussed in Section 1.5 and Appendix B.

1.5 Maintenance Instructions

The parties responsible for maintenance must review and apply the maintenance requirements contained herein. These maintenance instructions outline conditions for determining if maintenance actions are required, as identified through inspection. However, they are not intended to be measures of the facility's required condition at all times between inspections. Exceedance of these conditions at any time between inspections or maintenance activity does not automatically constitute a violation of these standards. However, based upon inspection observations, the inspection and maintenance presented in the checklists shall be adjusted to minimize the length of time that a facility is in a condition that requires a maintenance action. For facilities not owned and maintained by the city, a log of maintenance activity that indicates what actions were taken must be kept on site and be available for inspection by the city.

The detailed maintenance checklist for the downspout infiltration, as well as a general maintenance log sheet are included with this manual as Appendix B.

1.6 Vegetation Maintenance

There are no vegetation elements to stormwater control measures

1.7 Pollution Source Control Measures

The Washington Department of Ecology 2019 Stormwater Management Manual for Western Washington (2019 SWMMWW) identifies several best management practices (BMPs) which apply to all projects. These BMPs, listed below, are general processes the components of which are included in the City's stormwater pollution source control worksheet, attached to this report as Appendix C.

- S410 – Correcting Illicit Discharges to Storm Drains

- S453 – Formation of a Pollution Prevention Team
- S454 – Preventative Maintenance and Good Housekeeping
- S455 – Spill Prevention and Cleanup
- S456 – Employee Training
- S457 – Inspections
- S458 – Record Keeping

The City's stormwater pollution source control checklist was completed to identify BMPs specific to the project site and activities. The checklist is included with this manual as **Appendix C**. The following is a list of recommended pollution source control measures, the details of which are provided in the worksheets in **Appendix C**.

- S415 – Maintenance of Public and Private Utility Corridors and Facilities
- S417 – Maintenance of Stormwater Drainage and Treatment Facilities
- S421 – Parking and Storage of Vehicles and Equipment
- S407 – Dust Control at Disturbed Land Areas and Unpaved Roadways and Parking Lots
- S411 – Landscaping, Lawn, and Vegetation Management
- S428 – Storage of Liquids in Permanent Aboveground Tanks
- S409 – Fueling at Dedicated Stations
- S426 – Spills of Oil and Hazardous Substances

1.8 Annual Cost of Maintenance

The following table summarizes the estimated annual cost of maintenance for the stormwater facilities on this property.

Table 1 – Part I through Part III Cost Estimate

Part I: ON-SITE STORMWATER FACILITIES INVENTORY			Part II: ROUTINE O&M ASSUMPTIONS		Part III: ROUTINE O&M ESTIMATED ANNUAL COST	
Facility	Quantity	Unit	Activity	Frequency	Unit Price	Annual Cost

			Annual Report	Annual
Downspout Infiltration	1	EA	Trash, moss, and vegetation removal	Bi-Annual

Part IV: ESTIMATED PARTIAL REPLACEMENT COST		
Assumptions		Notes
Annual Inflation Rate	4%	Annual inflation rate of construction cost
Annual Interest Rate	2%	Estimate of how fast the account balance with grow
Year in Calculation	20	Duration of calculation
Precent of System Replaced in 20 years	20%	Assume 20% of the system will need replacement during the calculation period
Present Value of Stormwater System		Initial construction cost of the stormwater system
Initial Reserves	$0	Initial balance in the O&M account
Number of Owners	1	Number of lot owners
Using Above Assumptions Calculate Future Replacement Costs for 20% or the System and Required Annual Payments		
Description	Cost	Notes
Present Value of 20% of the Stormwater System		20% of total system present value
Future Replacement Cost for 20% of the Stormwater System		Present value adjusted for 20 years of inflation
Annual Payment for Future Replacement		Annual account contributions required to cover the future replacement cost. Accounts for interest.

Part V: ESTIMATED MONTHLY CONTRIBUTION TO STORMWATER FACILITIES O&M ACCOUNT

Description	Cost	Notes
Annual Payment for Routine O&M		Result of Part III
Annual Payment for Future Replacement		Result of Part IV
Total Annual Cost for O&M and Repair		Sum of Part II and Part IV
Total Monthly Cost for O&M and Repair		Annual cost divided by 12 months
Monthly Cost Per Lot Owner		Monthly cost divided by 1 lot owner

Attachment 4
Maintenance and Source Control Manual

Appendix A

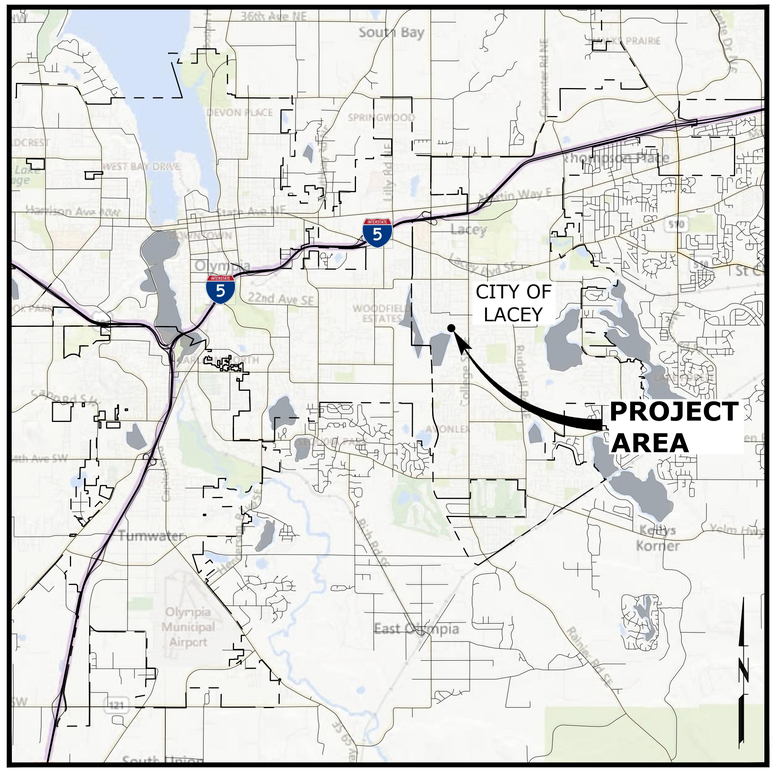
Site Development Drawings

CITY OF LACEY, WASHINGTON
LIFT STATION NO. 3 REPLACEMENT
LACEY CONTRACT #PW 2021-06

FEBRUARY 2022

60% SUBMITTAL

INDEX OF DRAWINGS



VICINITY MAP
SCALE: 1" = 1/12 MILE

CITY OF LACEY OFFICIALS

MAYOR:
ANDY RYDER

DEPUTY MAYOR:
CYNTHIA PRATT

COUNCIL MEMBERS:
CAROLYN COX
ED KUNKEL
LENNY GREENSTEIN
MALCOLM MILLER
MICHAEL STEADMAN

CITY MANAGER:
SCOTT SPENCE

CITY ATTORNEY:
DAVE SCHNEIDER

CITY ENGINEER:
ROGER SCHOESSEL, P.E.

DIRECTOR OF PUBLIC WORKS:
SCOTT EGGER, P.E.

APPROVED FOR CONSTRUCTION DATE

murraysmith
1145 BROADWAY
TACOMA, WA 98402

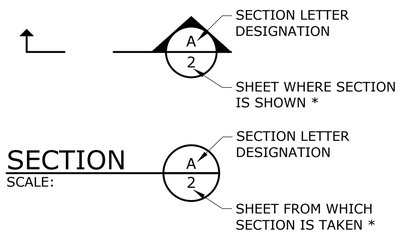
811 Know what's below. Call before you dig.

PIPE SYMBOLS

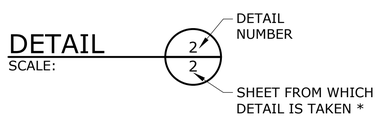
PLANT	SCHEMATIC	
		WELDED JOINT
		FLANGED JOINT
		GROOVED END JOINT
		MECHANICAL JOINT
		PUSH-ON JOINT (RUBBER GASKET)
		FLANGED COUPLING ADAPTER
		DOUBLE BALL FLEXIBLE EXTENSION COUPLING
		FLEXIBLE COUPLING W/THRUST RING
		ELBOW UP
		ELBOW DOWN
		TEE UP
		TEE DOWN
		LATERAL UP
		LATERAL DOWN
		CONCENTRIC REDUCER
		ECCENTRIC REDUCER
		UNION
		BLIND FLANGE
		CAP
		LONG SLEEVE
		FLEXIBLE COUPLING
		CAPPED END OR PLUGGED END
		FITTING

SECTION AND DETAIL DESIGNATIONS

SECTION DESIGNATIONS



DETAIL DESIGNATIONS



* NOTE: IF PLAN AND SECTION FOR DETAIL CALL-OUT AND DETAIL ARE SHOWN ON THE SAME DRAWING, DRAWING NUMBER IS REPLACED WITH A DASH.

TOPOGRAPHIC LEGEND

	EXISTING	PROPOSED
WATERLINE	10"W	12"DI W
ELECTRICITY	E	E
GAS	4"G	4"G
TELEPHONE/TELEMETRY	T	T
CABLE TELEVISION	CATV	CATV
SANITARY SEWER LINE	8"SS	8"SS
SANITARY SEWER FORCE MAIN	6"FM	6"FM
STORM DRAIN	8"SD	8"SD
CULVERT		12"D
ABANDON PIPE		
DRAINAGE DITCH		
BARBWIRE FENCE		
CHAIN LINK FENCE		
TEMPORARY SILT FENCE		
GUARDRAIL		
ROCK WALL		
TREE/BUSH LINE		
CENTERLINE		
EASEMENT/PROPERTY LINE		
RIGHT-OF-WAY		
EDGE OF PAVEMENT/AC		
EDGE OF GRAVEL		
CURB		
SIDEWALK	S/W	S/W
STRUCTURE OR FACILITY		
CONTOUR MINOR		
CONTOUR MAJOR	200	200
MANHOLE		
CLEAN-OUT		
CATCH BASIN/FIELD INLET		
THRUST BLOCK		
VALVE		
AIR INJECTION ASSEMBLY		
BLOW-OFF ASSEMBLY		
AIR RELEASE ASSEMBLY		
FIRE HYDRANT ASSEMBLY		
WATER METER		
PULL BOX/JUNCTION BOX		
UTILITY POLE		
GUY WIRE		
LIGHT POST		
MAIL BOX		
SIGN		
BENCHMARK		
TREE DECIDUOUS		
TREE CONIFEROUS		
TREE TO BE REMOVED		
SURFACE ELEVATION	+ 176.63	+ 176.63

VALVE SYMBOLS

PLANT	SCHEMATIC	
		GATE VALVE
		GLOBE VALVE
		BALL VALVE
		BALANCING VALVE
		DIAPHRAGM VALVE
		PLUG VALVE (TOP)
		PLUG VALVE (SIDE)
		3-WAY PLUG VALVE
		SWING CHECK VALVE
		DOUBLE CHECK ASSEMBLY
		BALL SWING CHECK
		SILENT CHECK VALVE
		PRESSURE REDUCING VALVE
		ALTITUDE CONTROL VALVE
		SOLENOID VALVE
		RELIEF VALVE
		NEEDLE VALVE
		HOSE VALVE
		REDUCED PRESSURE BACKFLOW PREVENTER W/GATE VALVES
		HOSE BIBB

MISCELLANEOUS PIPING SYMBOLS

	STRAINER
	SIGHT GLASS
	PRESSURE GAUGE W/COCK
S	PRESSURE SWITCH W/COCK
M	METER
SP	SLIP ON JOINT PIPE
R	RESTRAINED JOINT PIPE

60% SUBMITTAL

NO.	DATE	BY	REVISION

NOTICE

0 ½ 1

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

MCD DESIGNED
MNF DRAWN
PBC CHECKED

PRELIMINARY ONLY
DO NOT USE FOR CONSTRUCTION
PETER C. MURRAY
48352
REGISTERED PROFESSIONAL ENGINEER
February 4, 2022
murraysmith

murraysmith

Shaping our community together
CITY OF LACEY

CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

SYMBOLS & LEGEND

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET **G-2**

2 of 51

K:\TAC_Projects\21\3171 - Lacey - LS3 Replacement\CAD\Sheets\21-3171-WA-G.dwg G-2 2/18/2022 4:57 PM MATT.ESTEP 23.0s (LMS Tech)

@	AT
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY & TRANSPORTATION OFFICIALS
AB	ANCHOR BOLT
ABAN (D)	ABANDON (ED)
ABS	ACRYLONITRILE BUTADIENE STYRENE
ABV	ABOVE
AC	ASPHALTIC CONCRETE
ACP	ASPHALTIC CONCRETE PAVING
ADJ	ADJUSTABLE
ADJC	ADJACENT
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHR	ANCHOR
AL	ALUMINUM
ALT	ALTERNATE
AMP	AMPERE
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
APPROX	APPROXIMATE
APPVD	APPROVED
APWA	AMERICAN PUBLIC WORKS ASSOCIATION
ARCH	ARCHITECTURAL
ARV	AIR RELEASE VALVE
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ASSN	ASSOCIATION
ASSY	ASSEMBLY
ASTM	AMERICAN SOCIETY FOR TESTING & MATERIALS
ATM	ATMOSPHERE
AUTO	AUTOMATIC
AUX	AUXILIARY
AVE	AVENUE
AVG	AVERAGE
AWWA	AMERICAN WATER WORKS ASSOCIATION
B&S	BELL & SPIGOT
BC	BOLT CIRCLE
BD	BOARD
BETW	BETWEEN
BF	BOTH FACE
BFD	BACKFLOW PREVENTION DEVICE
BFILL	BACK FILL
BFV	BUTTERFLY VALVE
BHP	BRAKE HORSEPOWER
BKGD	BACKGROUND
BLDG	BUILDING
BLK	BLOCK
BLVD	BOULEVARD
BM	BENCH MARK / BEAM
BMP	BEST MANAGEMENT PRACTICE
BO	BLOWOFF
BOC	BACK OF CURB
BS	BOTH SIDES
BSMT	BASEMENT
BTF	BOTTOM FACE
BTU	BRITISH THERMAL UNIT
BV	BALL VALVE
BW	BOTH WAYS
C	CELSIUS
C TO C	CENTER TO CENTER
CARV	COMBINATION AIR RELEASE VALVE
CATV	CABLE TELEVISION
CB	CATCH BASIN
CCP	CONCRETE CYLINDER PIPE
CCW	COUNTER CLOCKWISE
CFM	CUBIC FEET PER MINUTE
CFS	CUBIC FEET PER SECOND
CHAN	CHANNEL
CHEM	CHEMICAL
CHFR	CHAMFER
CHKV	CHECK VALVE
CI	CAST IRON
CIP	CAST IRON PIPE
CIPC	CAST IN PLACE CONCRETE
CISP	CAST IRON SOIL PIPE
CJ	CONSTRUCTION JOINT
CL or ℄	CENTER LINE
CL2	CHLORINE
CLG	CEILING
CLJ	CONTROL JOINT
CLR	CLEAR
CLSM	CONTROLLED LOW STRENGTH MATERIAL
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CND	CONDUIT
CO	CLEANOUT
COL	COLUMN
COMB	COMBINATION
CONC	CONCRETE
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUOUS / CONTINUATION
CONTR	CONTRACT (OR)
COORD	COORDINATE
COP	COPPER
CORP	CORPORATION
CORR	CORRUGATED
CP	CONTROL POINT
CPLG	COUPLING
CPVC	CHLORINATED POLYVINYL CHLORIDE
CR	CRUSHED ROCK
CS	COMBINED SEWER
CSP	CONCRETE SEWER PIPE
CT	COURT
CTR	CENTER
CU	CUBIC
CULV	CULVERT
CV	CONTROL VALVE
CW	CLOCKWISE / COLD WATER
CY	CUBIC YARDS
CYL	CYLINDER LOCK
D	DRAIN
DBFEJ	DOUBLE BALL FLEXIBLE EXPANSION JOINT
DC	DIRECT CURRENT
DEFL	DEFLECTION
DET	DETAIL
DI	DUCTILE IRON
DIA	DIAMETER
DIM	DIMENSION
DIR	DIRECTION
DIST	DISTANCE
DN	DOWN
DR	DRIVE
DS	DOWNSPOUT
DWG	DRAWING
DWL	DOWEL
DWV	DRAIN WASTE AND VENT
DWY	DRIVEWAY
EA	EACH
ECC	ECCENTRIC
EF	EACH FACE
EL	ELEVATION
ELB	ELBOW
ELEC	ELECTRICAL
ENCL	ENCLOSURE
EOP	EDGE OF PAVEMENT
EQ	EQUAL
EQL SP	EQUALLY SPACED
EQUIP	EQUIPMENT
EW	EACH WAY
EXC	EXCAVATE
EXIST	EXISTING
EXIST GR	EXISTING GRADE
EXP	EXPANSION
EXP BT	EXPANSION BOLT
EXP JT	EXPANSION JOINT
EXT	EXTERIOR
F	FAHRENHEIT
F TO F	FACE TO FACE
FAB	FABRICATE
FB	FLAT BAR
FCA	FLANGED COUPLING ADAPTER
FCO	FLOOR CLEANOUT
FD	FLOOR DRAIN
FDN	FOUNDATION
FEXT	FIRE EXTINGUISHER
FF	FAR FACE
FGL	FIBERGLASS
FH	FIRE HYDRANT
FIN FL	FINISH FLOOR
FIN GR	FINISH GRADE
FIPT	FEMALE IRON PIPE THREAD
FITG	FITTING
FL	FLOOR LINE
FLEX	FLEXIBLE
FLG	FLANGE
FLL	FLOW LINE
FLR	FLOOR
FM	FORCE MAIN
FO	FIBER OPTIC
FOC	FACE OF CONCRETE
FOF	FACE OF FINISH
FOM	FACE OF MASONRY
FOS	FACE OF STUDS
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FRP	FIBERGLASS REINFORCED PLASTIC
FT	FEET / FOOT
FTG	FOOTING
FUT	FUTURE
FXTR	FIXTURE
G	GAS
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GC	GROOVED COUPLING
GFA	GROOVED FLANGE ADAPTER
GI	GALVANIZED IRON
GIP	GALVANIZED IRON PIPE
GJ	GRIP JOINT
GL	GLASS
GLV	GLOBE VALVE
GND	GROUND
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GPS	GALLONS PER SECOND
GR	GRADE
GR LN	GRADE LINE
GRTG	GRATING
GV	GATE VALVE
GRVL	GRAVEL
GYP	GYPSUM
HB	HOSE BIBB
HC	HOLLOW CORE
HDPE	HIGH DENSITY POLYETHYLENE
HDR	HEADER
HDWE	HARDWARE
HGR	HANGER
HGT	HEIGHT
HH	HANDHOLD
HM	HOLLOW METAL
HNDRL	HAND RAIL
HOA	HAND-OFF-AUTO
HOR	HAND-OFF-REMOTE
HORIZ	HORIZONTAL
HP	HIGH PRESSURE / HORSEPOWER
HPG	HIGH PRESSURE GAS
HPT	HIGH POINT
HR	HOUR
HSB	HIGH STRENGTH BOLT
HV	HOSE VALVE
HVAC	HEATING, VENTILATION, AIR CONDITIONING
HWL	HIGH WATER LINE
HWY	HIGHWAY
HYD	HYDRANT
HYDR	HYDRAULIC
I&C	INSTRUMENTATION & CONTROL
IAW	IN ACCORDANCE WITH
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IF	INSIDE FACE
IMPVT	IMPROVEMENT
IN	INCH
INCC	INCLUDE (D) (ING)
INFL	INFLUENT
INJ	INJECTION
INSTL	INSTALLATION / INSTALL
INSUL	INSULATION
INTER	INTERCEPTOR
INTR	INTERIOR
INV	INVERT
IP	IRON PIPE
IPT	IRON PIPE THREAD
IR	IRON ROD
IRRIG	IRRIGATION
JT	JOINT
JUNC	JUNCTION
KPL	KICK PLATE
KVA	KILOVOLT AMPERE
KW	KILOWATT
KWY	KEYWAY
L	LENGTH OF CURVE
LAB	LABORATORY
LAV	LAVATORY
LB	POUND
LF	LINEAL FOOT
LIN	LINEAL / LINEAR
LN	LANE
LOC	LOCATION
LONG	LONGITUDINAL
LP	LOW PRESSURE
LPT	LOW POINT
LRG	LARGE
LS	LONG SLEEVE / LUMP SUM
LT	LEFT
LVL	LEVEL
LWL	LOW WATER LINE
MAN	MANUAL
MATL	MATERIAL
MAX	MAXIMUM
MCC	MOTOR CONTROL CENTER
MCP	MASTER CONTROL PANEL
MECH	MECHANICAL
MET	METAL
MFR	MANUFACTURER
MGD	MILLION GALLONS PER DAY
MH	MANHOLE
MIN	MINIMUM
MIPT	MALE IRON PIPE THREAD
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MON	MONUMENT / MONOLITHIC
MOT	MOTOR
MP	MILEPOST
MSL	MEAN SEA LEVEL
MTD	MOUNTED
NA	NOT APPLICABLE
NC	NORMALLY CLOSED
NF	NEAR FACE
NIC	NOT IN CONTRACT
NO / NO.	NORMALLY OPEN / NUMBER
NOM	NOMINAL
NORM	NORMAL
NRS	NON-RISING STEM
NTS	NOT TO SCALE
O TO O	OUT TO OUT
OC	ON CENTER
OD	OUTSIDE DIAMETER
ODOT	OREGON DEPARTMENT OF TRANSPORTATION
OF	OVERFLOW / OUTSIDE FACE
OPNG	OPENING
OPP	OPPOSITE
ORIG	ORIGINAL
OVHD	OVERHEAD
P&ID	PROCESS & INSTRUMENTATION DIAGRAM
PC	POINT OF CURVE
PCC	POINT OF COMPOUND CURVE
PCVC	POINT OF CURVATURE ON VERTICAL CURVE
PE	PLAIN END
PERF	PERFORATED
PERM	PERMANENT
PERP	PERPENDICULAR
PG	PRESSURE GAUGE
PH	PIPE HANGER
PI	POINT OF INTERSECTION
PIVC	POINT OF INTERSECTION ON VERTICAL CURVE
PL or ℄	PROPERTY LINE / PLATE / PLASTIC
PLBG	PLUMBING
PNL	PANEL
POC	POINT OF CURVATURE
POLY	POLYETHYLENE
POT	POINT OF TANGENCY
PP	POWER POLE
PRC	POINT OF REVERSE CURVATURE
PRCST	PRECAST
PREP	PREPARATION
PRESS	PRESSURE
PRKG	PARKING
PROP	PROPERTY
PRV	PRESSURE REDUCING VALVE
PS	PUMP STATION
PSIG	POUNDS PER SQUARE INCH GAGE
PSL	PIPE SLEEVE
PSPT	PIPE SUPPORT
PT	POINT OF TANGENCY
PTVC	POINT OF TANGENCY ON VERTICAL CURVE
PV	PLUG VALVE
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
PWR	POWER
QTY	QUANTITY
RAD	RADIUS
RC	REINFORCED CONCRETE
RCP	REINFORCED CONCRETE PIPE
RD	ROAD / ROOF DRAIN
RDCR	REDUCER
REF	REFERENCE
REINF	REINFORCE (D) (ING) (MENT)
REQ'D	REQUIRED
RESTR	RESTRAINED
RFCA	RESTRAINED FLANGE COUPLING ADAPTER
RM	ROOM
RND	ROUND
RO	ROUGH OPENING
ROW or R/W	RIGHT OF WAY
RPBPD	REDUCED PRESSURE BACKFLOW PREVENTION DEVICE
RPM	REVOLUTIONS PER MINUTE
RR	RAILROAD
RST	REINFORCING STEEL
RT	RIGHT
SALV	SALVAGE
SAN	SANITARY
SC	SOLID CORE
SCHED	SCHEDULE
SD	STORM DRAIN
SDL	SADDLE
SDR	STANDARD DIMENSION RATIO
SECT	SECTION
SHLDR	SHOULDER
SHT	SHEET
SIM	SIMILAR
SLP	SLOPE
SLV	SLEEVE
SOLN	SOLUTION
SP	SOIL PIPE / SEWER PIPE
SPCL	SPECIAL
SPEC (S)	SPECIFICATION (S)
SPG	SPACING
SPL	SPOOL
SPRT	SUPPORT
SQ	SQUARE
SQ FT	SQUARE FOOT
SQ IN	SQUARE INCH
SQ YD	SQUARE YARD
SS	SANITARY SEWER
SST	STAINLESS STEEL
ST	STREET
STA	STATION
STD	STANDARD
STL	STEEL
STOR	STORAGE
STR	STRAIGHT
STRUCT	STRUCTURE / STRUCTURAL
SUBMG	SUBMERGED
SUCT	SUCTION
SV	SOLENOID VALVE
S/W	SIDEWALK
SWD	SIDEWATER DEPTH
SWGR	SWITCH GEAR
SYMM	SYMMETRICAL
SYS	SYSTEM
T or TEL	TELEPHONE
T&B	TOP & BOTTOM
TAN	TANGENCY
TB	THRUST BLOCK
TBM	TEMPORARY BENCH MARK
TC	TOP OF CONCRETE / TOP OF CURB
TDH	TOTAL DYNAMIC HEAD
TEMP	TEMPERATURE / TEMPORARY
T&G	TONGUE & GROOVE
THK	THICKNESS
THRD	THREAD(ED)
THRU	THROUGH
TP	TEST PIT/TOP OF PAVEMENT/TURNING POINT
TRANS	TRANSITION
TSP	TRI-SODIUM PHOSPHATE
TST	TOP OF STEEL
TW	TOP OF WALL
TYP	TYPICAL
UG	UNDERGROUND
UH	UNIT HEATER
UN	UNION
UON	UNLESS OTHERWISE NOTED
USGS	UNITED STATES GEOLOGIC SURVEY
V	VENT / VOLT
VAC	VACUUM
VB	VACUUM BREAKER
VBOX	VALVE BOX
VC	VERTICAL CURVE
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VOL	VOLUME
VCP	VITRIFIED CLAY PIPE
VTR	VENT THROUGH ROOF
W	WATER
W/	WITH
W/O	WITHOUT
W/W	WALL TO WALL
WD	WOOD
WF	WIDE FLANGE
WH	WALL HYDRANT
WHTR	WATER HEATER
WI	WROUGHT IRON
WM	WATER METER
WP	WORKING POINT / WATERPROOFING
WS	WATER SERVICE
WSDOT	WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
WT	WEIGHT
WTP	WATER TREATMENT PLANT
WTRT	WATERTIGHT
WWF	WELDED WIRE FABRIC
WWTF	WASTEWATER TREATMENT FACILITY
WWTP	WASTEWATER TREATMENT PLANT
X SECT	CROSS SECTION
XFMR	TRANSFORMER
YD	YARD DRAIN/YARD
YH	YARD HYDRANT
YR	YEAR
ZN	ZINC

60% SUBMITTAL

NO.	DATE	BY	REVISION

NOTICE

0 ½ 1

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

MCD DESIGNED

MNF DRAWN

PBC CHECKED

PRELIMINARY ONLY
DO NOT USE FOR CONSTRUCTION
February 2022
Murraysmith

murraysmith

Shaping our community together
CITY OF LACEY

CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

ABBREVIATIONS

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET **G-3**

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GENERAL NOTES

1. CONTRACTOR SHALL ADHERE TO THE CITY OF LACEY DEVELOPMENT GUIDELINES & PUBLIC WORKS STANDARDS FOR SANITARY SEWER CONSTRUCTION.

2. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK AND SHALL IMMEDIATELY NOTIFY THE ENGINEER OF ANY DISCREPANCIES.

3. THE LOCATION OF EXISTING UNDERGROUND UTILITY SYSTEMS, AS SHOWN HEREON, ARE SHOWN IN AN APPROXIMATE WAY ONLY. WATER AND GAS SERVICE LINES MAY NOT BE SHOWN. THE CONTRACTOR SHALL ANTICIPATE SUCH SERVICES. THE CONTRACTOR SHALL LOCATE AND PROTECT ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES. ALL LOCATOR SERVICES SHOULD BE CONTACTED PRIOR TO ANY CONSTRUCTION OR SUBSURFACE EXPLORATION.

4. CONTRACTOR SHALL POTHOLE ALL EXISTING UTILITIES INCLUDING SEWER MAIN, FORCE MAIN, AND LATERALS TO DETERMINE THEIR EXACT HORIZONTAL AND VERTICAL LOCATION IN ACCORDANCE WITH SPECIFICATION 7-08.3(1)

5. LINEAL FOOTAGE OF PIPING SHOWN ON THE DRAWINGS REFERS TO THE HORIZONTAL LENGTHS.

6. PRIOR TO BACKFILL ALL PIPES AND APPURTENANCES SHALL BE INSPECTED BY THE CONSTRUCTION INSPECTOR. APPROVAL SHALL NOT RELIEVE THE CONTRACTOR FOR CORRECTION OF ANY DEFICIENCIES AND/OR FAILURES AS DETERMINED BY SUBSEQUENT TESTING AND INSPECTION.

7. THE CONTRACTOR SHALL PROVIDE TEMPORARY TAPS AND BLOW-OFFS AND THRUST RESTRAINTS AS REQUIRED TO FACILITATE TESTING OF PIPELINES. AT COMPLETION, REMOVE TEMPORARY TEST TAPS AND REPLACE WITH PERMANENT STAINLESS STEEL PLUGS.

8. CONTRACTOR SHALL MAKE ALL ARRANGEMENTS NECESSARY TO OBTAIN SUFFICIENT WATER, POWER AND LIGHTING FOR CONSTRUCTION PURPOSES.

9. RESTRAIN ALL DUCTILE IRON PIPING, MECHANICAL JOINT VALVES, TEES, BENDS, COUPLINGS AND FITTINGS. RESTRAIN PVC PIPING IN ACCORDANCE WITH DRAWINGS.

10. WORK IDENTIFIED ON THESE PLANS AND ASSOCIATED CONSTRUCTION DOCUMENTS INCLUDE WORK ON AN EXISTING PUBLIC SANITARY SEWER SYSTEM. THE EXISTING SANITARY SEWER SYSTEM AND COMPONENTS MUST REMAIN IN OPERATION AT ALL TIMES. SANITARY SEWER FLOW IS CONTINUOUS AND CANNOT BE TURNED OFF.

11. CONTRACTOR SHALL NOT REMOVE ANY TREES UNLESS INDICATED ON PLANS OR DIRECTED BY ENGINEER.

EROSION CONTROL NOTES

1. EROSION CONTROL MEASURES SHALL BE TAKEN BY THE CONTRACTOR DURING CONSTRUCTION TO PREVENT THE MIGRATION OF SILT AND DEBRIS. EROSION CONTROL BEST MANAGEMENT PRACTICES SHALL BE IN COMPLIANCE WITH THESE CONTRACT DOCUMENTS AND WITH THE CITY OF LACEY 2016 STORMWATER DESIGN MANUAL.

2. THE TEMPORARY EROSION CONTROL SYSTEM SHALL BE INSTALLED PRIOR TO ALL OTHER CONSTRUCTION AND SHALL BE MAINTAINED IN A SATISFACTORY CONDITION UNTIL CLEARING AND/OR CONSTRUCTION IS COMPLETED. PERMANENT DRAINAGE FACILITIES ARE OPERATIONAL AND THE POTENTIAL FOR EROSION HAS PASSED.

VERTICAL DATUM NGVD 29

CITY OF LACEY BM#1318
MAG NAIL W/FLASHER ON EAST SIDE
GOLF CLUB RD SE, 18' S. OF CL
CHAMBERS LAKE DR SE, 23' S. OF SSMH
ELEV.=199.600

3/2021
DATE OF SURVEY

The Topographic Survey depicts the physical features that were visible at the time of the survey. The City of Lacey is not responsible for the location of underground utilities that are marked or not marked in the field by other utility providers. All feature locations should be independently verified prior to design or construction.

LIFT STATION INSTALLATION GENERAL NOTES

1. ANY CONSTRUCTION CHANGES TO THE LIFT STATION DESIGN SHALL FIRST BE REVIEWED AND APPROVED BY THE PROJECT ENGINEER AND THE CITY OF LACEY.

2. CONTRACTORS SHALL BE RESPONSIBLE FOR CLEANUP OF ANY DEBRIS IN THE WET WELL, TANKS, VAULTS AND SITE ASSOCIATED WITH THE PROJECT PRIOR TO START UP.

3. PRIOR TO BACKFILL, ALL MAINS, TANKS, WET WELL, ELECTRICAL CONDUITS (ELECTRICAL CONDUIT INSPECTION SHALL BE COORDINATED THROUGH THE CITY INSPECTOR WITH THE CITY MAINTENANCE DEPARTMENT) AND VAULTS SHALL BE INSPECTED AND APPROVED BY THE CITY OF LACEY CONSTRUCTION INSPECTOR. APPROVAL SHALL NOT RELIEVE THE CONTRACTOR FOR CORRECTION OF ANY DEFICIENCIES AND/OR FAILURES AS DETERMINED BY SUBSEQUENT TESTING AND INSPECTIONS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONTACT CITY OF LACEY TO REQUEST THE REQUIRED INSPECTIONS.

4. THE CONTRACTOR SHALL COORDINATE POWER SERVICE WITH SERVING UTILITIES AND MAKE ARRANGEMENTS FOR POWER SERVICE CONNECTION.

5. ALL PIPE AND FITTINGS IN THE WET WELL SHALL BE DUCTILE IRON THICKNESS CLASS 52. DUCTILE IRON PIPE AND FITTINGS SHALL BE EPOXY LINED AND POLYETHYLENE COATED. ALL BOLTS, FASTENERS, BRACKETS AND HARDWARE IN THE WET WELL SHALL BE 316 STAINLESS STEEL.

6. **PRIOR** TO TESTING AND START-UP OF THE LIFT STATION, TWO HARD COPIES ALONG WITH AN ELECTRONIC COPY OF THE OPERATION AND MAINTENANCE MANUAL, SHALL BE SUBMITTED TO THE CITY FOR REVIEW AND APPROVAL.

7. THE CONTRACTOR, AT ITS OWN EXPENSE, SHALL ARRANGE FOR AN AUTHORIZED FACTORY-TRAINED REPRESENTATIVE OF THE COMPANY OR COMPANIES SUPPLYING THE VARIOUS ITEMS OF EQUIPMENT TO CHECK THE INSTALLATION, ADJUST AND TEST THE EQUIPMENT FURNISHED BEFORE THE ACCEPTANCE OF THE WORK BY THE CITY. THE FACTORY REPRESENTATIVE SHALL BE RESPONSIBLE TO CHECK AND RESOLVE ANY UNACCEPTABLE VIBRATION OF THE PUMP ASSEMBLIES. FURTHERMORE, THE CONTRACTOR'S REPRESENTATIVE(S) SHALL ASSIST AND INSTRUCT THE CITY'S OPERATING STAFF IN ADJUSTING AND OPERATING THE EQUIPMENT DURING THE INITIAL START-UP PERIOD. SAID REPRESENTATIVE SHALL BE EXPERIENCED AND KNOWLEDGEABLE OF THE EQUIPMENT BEING TESTED. PRIOR TO THE START UP BEING REQUESTED, THE CONTRACTOR SHALL CONDUCT A SUCCESSFUL PRE-START UP. THE PRE-START UP SHALL INCLUDE CALIBRATION AND TESTING OF ALL EQUIPMENT ON THE PRE-START UP CHECKLIST.

8. AN INSTRUCTION PROGRAM SHALL BE HELD FOR CITY PERSONNEL AT THE CONTRACTOR'S EXPENSE. CONTRACTOR SHALL FURNISH THE SERVICES OF QUALIFIED INSTRUCTORS FROM THE VARIOUS EQUIPMENT MANUFACTURERS. PROGRAM SHALL COVER BASIC SYSTEM OPERATION THEORY, ROUTINE MAINTENANCE AND REPAIR, AND "HANDS ON" OPERATION OF EQUIPMENT. TRAINING SHALL NOT PROCEED UNTIL ALL OPERATION AND MAINTENANCE MANUALS ARE COMPLETE AND ACCEPTED BY THE CITY.

9. CONTRACTOR IS RESPONSIBLE TO CONSTRUCT AND START UP A COMPLETE AND TROUBLE-FREE SYSTEM. ALL CONSTRUCTION DEFECTS DISCOVERED DURING START UP OR THE WARRANTY PERIOD STATED IN THE AGREEMENT WITH THE CITY SHALL BE CORRECTED AT THE CONTRACTOR'S EXPENSE. THE CITY WILL NOT ACCEPT ANY FACILITY UNTIL SUCCESSFUL FULL OPERATION OF ALL COMPONENTS HAS BEEN DEMONSTRATED. THE CONTRACTOR SHALL CONDUCT A PRE-START UP WITHOUT CITY STAFF TO VERIFY PROPER OPERATION OF ALL LIFT STATION COMPONENTS PRIOR TO SCHEDULING A START UP WITH CITY OF LACEY STAFF.

10. CONTRACTOR SHALL LUBRICATE ALL EQUIPMENT AS REQUIRED BY THE PART OR COMPONENT MANUFACTURER.

11. WET WELL SHALL HAVE A RAIL SYSTEM INSTALLED PER LACEY STANDARD 7C.050 PRIOR TO START UP AND ACCEPTANCE.

12. LIFT STATION AND GENERATOR, SITE, DRIVEWAY, ACCESS, CONCRETE AREAS, LIGHTING AND WATER SERVICE SHALL ALL BE COMPLETED PRIOR TO START UP AND INSPECTION REQUEST.

13. GENERATOR AND FUEL STORAGE TANK SHALL BE MOUNTED ON CONCRETE PAD. THE FUEL TANK SHALL BE FULL OF FUEL AT THE TIME OF START-UP. GENERATOR SHALL HAVE WEATHER PROOF, SOUND DAMPENING ENCLOSURE; BLOCK HEATER; BATTERY CHARGER; AUTO EXERCISER; RADIATOR LOUVERS OR PROTECTION; AND SHALL COMPLY WITH ALL REQUIREMENTS IN CHAPTER 7C.070.

14. TELEMETRY SET UP, INCLUDING REVISION OF TELEMETRY COMPUTER MONITORS AT THE MAINTENANCE SERVICE CENTER, SHALL BE COORDINATED WITH CITY PROGRAMMER. SET UP SHALL BE COMPLETED PRIOR TO START UP REQUEST AND ACCEPTANCE.

15. THE FOLLOWING ITEMS SHALL BE PROVIDED FOR THE STATION AT TIME OF STARTUP ACCEPTANCE.

- ONE SPARE PUMP AND MOTOR ASSEMBLY
- ONE ADJUSTABLE WEAR LINER
- ONE COMPLETE RE-BUILD KIT FOR EACH PUMP AND MOTOR
- CERTIFIED PUMP PERFORMANCE TESTING
- ARC FLASH AND SHORT CIRCUIT CALCULATIONS AND ARC FLASH LABELING FOR PANEL, GENERATOR, AND DISCONNECTS

ADDITIONALLY, ANY SPECIAL TOOLS SPECIFIC TO THE PUMP MANUFACTURER SHALL BE PROVIDED TO THE CITY OF LACEY AT START UP.

16. DUPLICATE PUMP AND MOTOR DATA PLATES SHALL BE PROVIDED TO THE CITY OF LACEY AT THE TIME OF START-UP. ACCEPTANCE OF THE PUMPS WILL BE CONTINGENT UPON FACTORY TEST DATA CONFORMANCE WITH DESIGN PERFORMANCE DATA. CONTRACTOR SHALL BE REQUIRED TO REMOVE PUMPS FROM WET WELL FOR INSPECTION AT TIME OF START-UP.

17. THE CONTRACTOR SHALL PROVIDE TEST DATA FROM A STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER FOR ALL BACKFLOW DEVICES ON SITE PRIOR TO THE START UP.

18. A COMPACTION REPORT SHALL BE PROVIDED TO THE CITY INSPECTOR FOLLOWING WET WELL AND VALVE VAULT BACKFILL.

19. CHECK VALVES SHALL BE SEWER RATED BRONZE ON BRONZE STYLE SEAT WITH AN OUTSIDE LEVER AND SPRING. VALVES SHALL BE COATED BY THE MANUFACTURER ON THE INSIDE AND OUTSIDE WITH THE MANUFACTURERS EPOXY COATING RATED FOR SEWER. CHECK VALVES SHALL BE ORDERED AND INSTALLED IN THE VAULT AS ONE RIGHT HAND AND ONE LEFT HAND MODEL WITH THE OUTSIDE LEVERS FURTHEST AWAY FROM EACH OTHER (OUTSIDE OF PIPING CONFIGURATION). THE VALVE VAULT EMERGENCY BY-PASS PUMPING CONNECTIONS SHALL BE 6 INCH 316 STAINLESS STEEL MALE CAM LOCK STYLE FITTINGS. FITTINGS SHALL HAVE AN STAINLESS FEMALE CAP INSTALLED. CAM LOCK FITTINGS SHALL FACE "UP" AS SHOWN ON THE DETAIL AND CLEARLY VISIBLE AND ACCESSIBLE FOR CONNECTION WITH 6 INCH BY-PASS HOSE FROM ABOVE.

20. ISOLATION VALVES IN THE VALVE VAULT SHALL BE FULL PORT ROUND 100 PERCENT OPENING PLUG VALVES: CRISPIN, PRATT OR MILLIKEN. VALVES SHALL BE EPOXY COATED ON BOTH THE INSIDE AND OUTSIDE A MINIMUM OF 10 MILS THICK WITH A COATING APPROVED FOR SEWER. 4 INCH VALVES SHALL HAVE A HAND LEVER SUPPLIED FOR EACH VALVE. 6 INCH AND LARGER VALVES SHALL HAVE GEAR REDUCTION OPERATION WITH HAND WHEELS.

21. THE BUILDERS FACILITY INTEGRATOR SHALL BE MANUFACTURED AND TESTED AT THE BUILDERS FACILITY INTEGRATOR MANUFACTURER'S FACILITY. AFTER MANUFACTURER HAS VERIFIED THE BUILDERS FACILITY INTEGRATOR IS FULLY FUNCTIONAL, THE INSPECTOR SHALL BE NOTIFIED AND A CITY WITNESSED BUILDERS FACILITY INTEGRATOR FACTORY TEST SHALL BE SCHEDULED AND COMPLETED BEFORE SHIPMENT OF THE CONTROL PANEL. THE CONTROL PANEL SHALL NOT BE SHIPPED FROM THE BUILDERS FACILITY INTEGRATOR MANUFACTURER'S FACILITY PRIOR TO WRITTEN VERIFICATION OF TESTING FROM THE CITY.

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CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

NOTES

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
G-4
4 of 51

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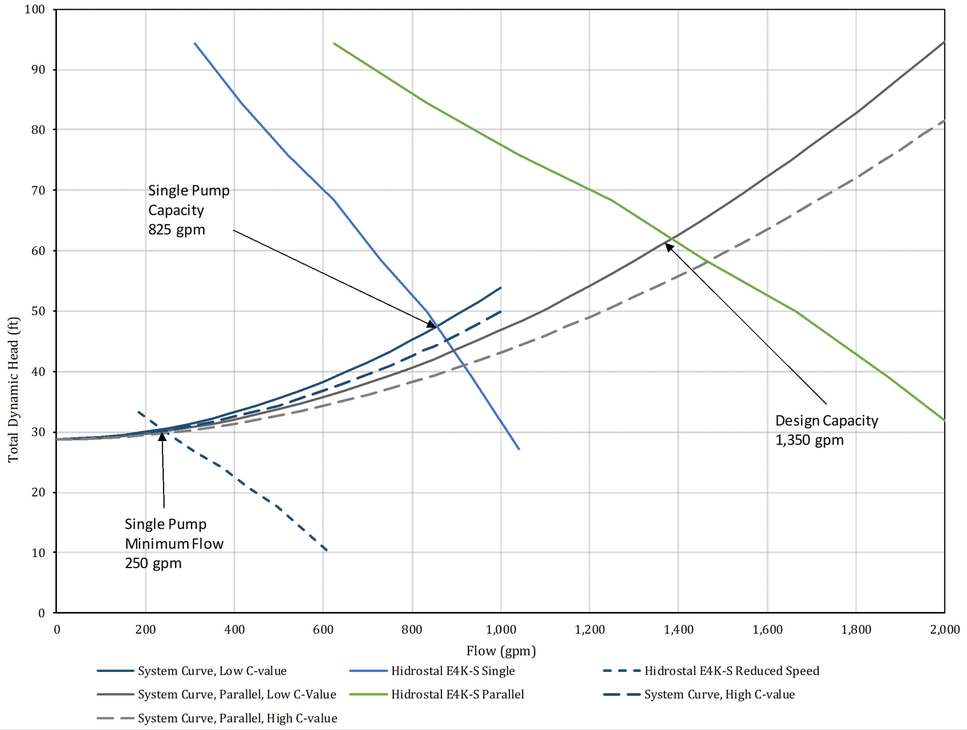

NOTE: PUMP CURVES BASED ON MANUFACTURER INTO FOR HIDROSTAL MODEL E4K-S

PUMP & SYSTEM HEAD - CAPACITY CURVES

LIST STATION 3 SYSTEM & PUMP CURVES

PUMP STATION	
LOCATION	4406 26TH AVE SE, LACEY, WA, 98503
PUMP STATION TYPE	TRIPLEX SUBMERSIBLE
PUMP TYPE	VARIABLE SPEED NON CLOG SCREW IMPELLER
DESIGN PEAK HOURLY INFLUENT FLOW	1350 GPM
PUMP CAPACITY (PARALLEL OPERATION, PER PUMP) AT 100% OF RATED SPEED	675 GPM @ 55' TDH
PUMP CAPACITY (SINGLE PUMP) AT 100% OF RATED SPEED	825 GPM @ 46' TDH
MAXIMUM PUMP STARTS PER HOUR, PER PUMP	15
MOTOR HORSEPOWER, HP	20 HP
WET WELL LEVEL MEASUREMENT SENSOR	ULTRASONIC
WET WELL OPERATING VOLUME, PUMPS OFF TO LEAD PUMP ON	2,100 GALLONS
OVERFLOW POINT/OVERFLOW ELEVATION	WET WELL RIM, 26TH AVE SE 199.5
AUXILIARY POWER TYPE	STATIONARY DIESEL GENERATOR
AUXILIARY POWER LOCATION	ONSITE
AUXILIARY POWER OUTPUT	80 KW
AUXILIARY POWER FUEL TANK CAPACITY (FULL)	425 GALLONS (APPROX 48 HOURS RUN-TIME)
AUXILIARY POWER TRANSFER SWITCH	AUTOMATIC
ALARM TELEMETRY TYPE	RADIO AND CELLULAR
EPA RELIABILITY CLASS	CLASS 1

DESIGN DATA SUMMARY TABLES

FORCE MAIN DISCHARGE PIPING			
PIPE SIZE	6 INCHES	10 INCHES	10 INCHES
PIPE MATERIAL	DI	DI	PVC
PIPE LENGTH	36 FEET	5 FEET	1800 FEET
C-VALUE	120-140	120-140	130-150
CUMULATIVE K-VALUE BY PIPE SECTION	4.7000	0.4000	1.6500

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DESIGN DATA TABLE & LEGEND

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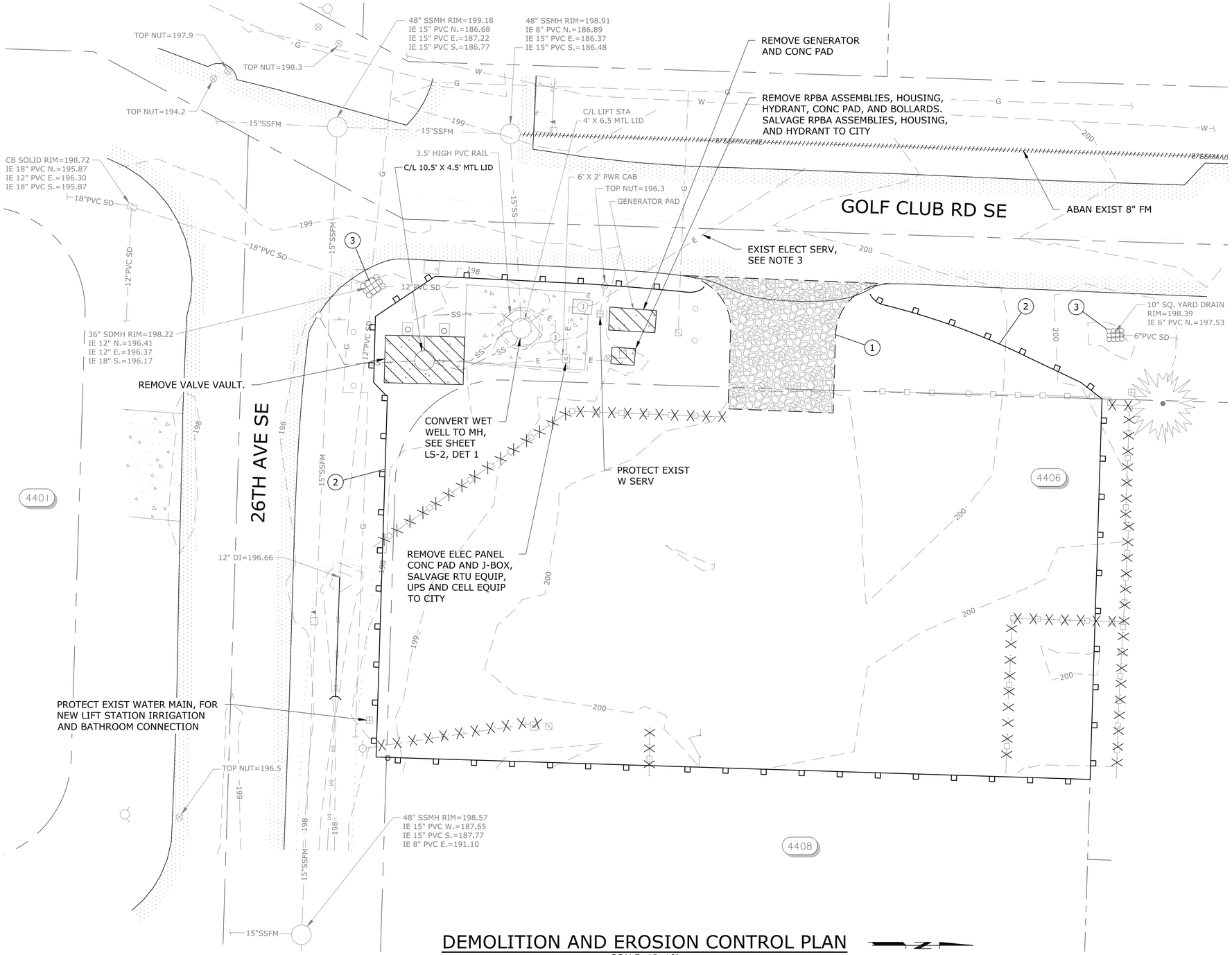
SHEET
G-5
5 of 51



DEMOLITION AND EROSION CONTROL PLAN

SCALE: 1"=10'

ESC KEY NOTES:

1. INSTALL STABILIZED CONSTRUCTION ENTRANCE PER SHEET LS-2, DETAIL 2.
2. INSTALL HIGH VISIBILITY SILT FENCE PER SHEET LS-2, DETAIL 3.
3. INSTALL STORM DRAIN INLET PROTECTION PER SHEET LS-2, DETAIL 4.

ESC LEGEND

- SILT BAG/INLET PROTECTION
- SILT FENCE
- REMOVE/DEMOLISH
- CONSTRUCTION ENTRANCE
- DEMOLITION

DEMOLITION NOTES:

1. LIFT STATION REPLACEMENT AND PIPELINE CONSTRUCTION REQUIRED DETAILED PLANNING OF CONSTRUCTION SEQUENCING, SPECIAL COORDINATION AND COMPREHENSIVE PROGRAMMING, COMBINED WITH OTHER SPECIAL WORK ACTIVITIES. CONTRACTOR SHALL PREPARE AND SUBMIT A DETAILED WORK SEQUENCE PLAN TO THE ENGINEER FOR REVIEW BEFORE CONSTRUCTION ACTIVITIES BEGIN.
2. THE EXISTING PUMP STATION FACILITIES SHALL BE REMOVED FROM SERVICE AND DEMOLISHED ACCORDING TO THESE CONTRACT DRAWINGS AND SPECIFICATIONS.
3. COORDINATE ELECTRICAL SERVICE ABANDONMENT WITH PUGET SOUND ENERGY.
4. RESTORE SHOULDER AREA FOLLOWING DEMOLITION ACTIVITIES WITH CRUSHED ROCK FOR SHOULDER GRADING.
5. REMOVE EXISTING PIPING, CONDUIT AND CONDUCTORS TO A MINIMUM OF 3' BELOW EXIST GRADE IN CONJUNCTION WITH THE ELECTRICAL PANEL, GENERATOR AND RPBA DEMOLITION.

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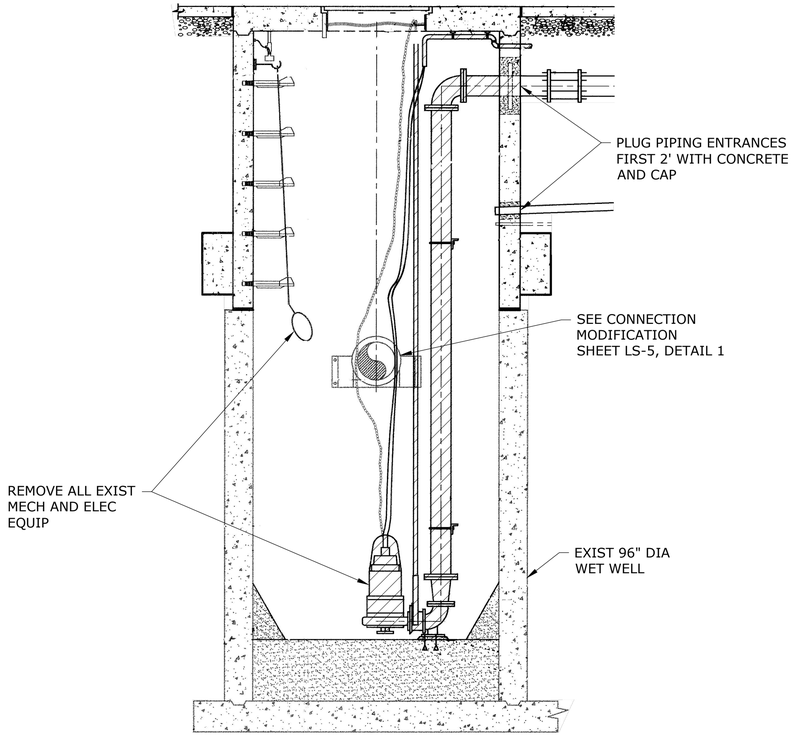
EXISTING LIFT STATION SITE DEMOLITION & EROSION CONTROL PLAN

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
LS-1
6 of 51



DEMOLITION NOTES:

1. LIFT STATION REPLACEMENT AND PIPELINE CONSTRUCTION REQUIRES DETAILED PLANNING OF CONSTRUCTION SEQUENCING, SPECIAL COORDINATION AND COMPREHENSIVE PROGRAMMING, COMBINED WITH OTHER SPECIAL WORK ACTIVITIES. CONTRACTOR SHALL PREPARE AND SUBMIT A DETAILED WORK SEQUENCE PLAN TO THE ENGINEER FOR REVIEW BEFORE CONSTRUCTION ACTIVITIES BEGIN.

2. THE EXIST PUMP STATION FACILITIES SHALL BE REMOVED FROM SERVICE AND DEMOLISHED ACCORDING TO THESE CONTRACT DRAWINGS AND SPECIFICATIONS AFTER ACCEPTANCE BY OWNER OF NEW LIFT STATION.

3. COORDINATE ELECTRICAL SERVICE DISCONNECT FOR THE EXIST LIFT STATION AFTER NEW STATION IS IN SERVICE WITH PUGET SOUND ENERGY.

4. REMOVE EXIST PIPING, CONDUIT AND CONDUCTORS TO A MINIMUM OF 3' BELOW EXIST GRADE IN CONJUNCTION WITH THE ELECTRICAL PANEL, GENERATOR AND RPBA DEMOLITION.

5. SEE DETAIL 1, SHEET LS-8 FOR ADDITIONAL MODIFICATIONS.

EXIST WET WELL DEMOLITION SECTION

SCALE: NTS

1 / LS-1

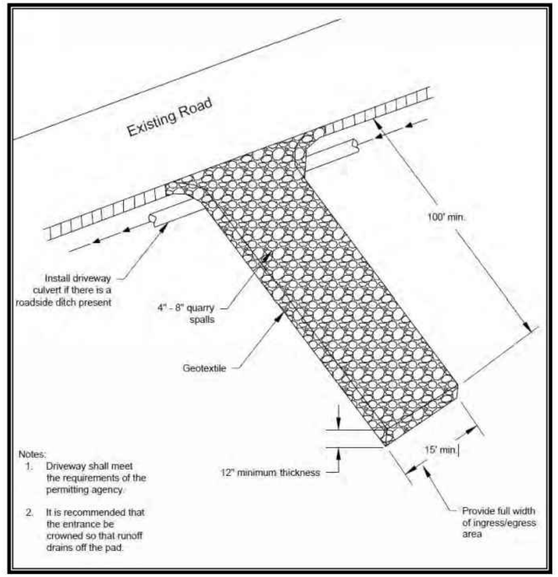


Figure 5.1. Stabilized Construction Entrance.

STABILIZED CONSTRUCTION ENTRANCE

SCALE: NTS

2 / LS-1

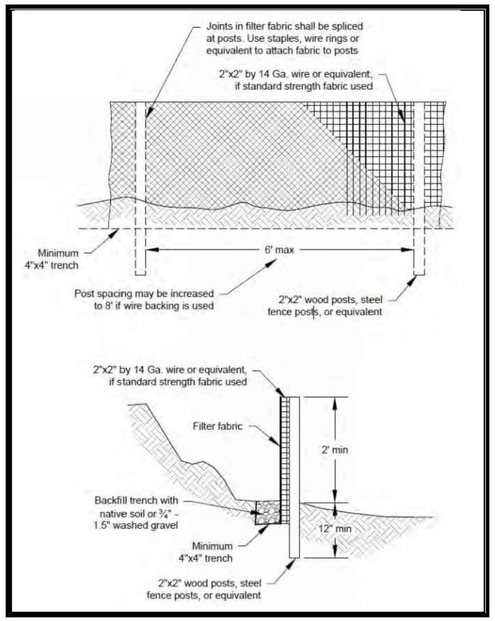
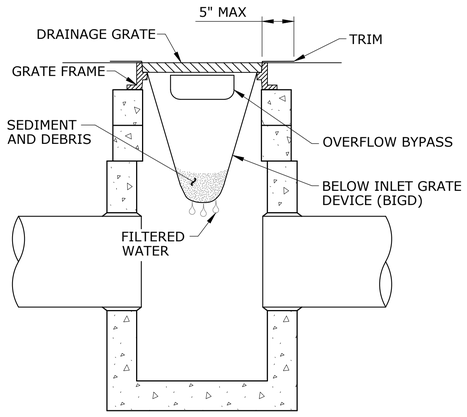


Figure 5.20. Silt Fence.

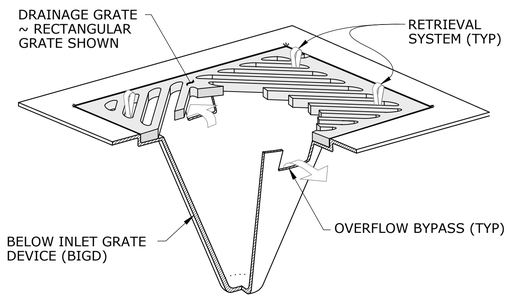
SILT FENCE

SCALE: NTS

3 / LS-1



SECTION VIEW



ISOMETRIC VIEW

NOTES:

1. SIZE THE STORM DRAIN INLET PROTECTION FOR THE STORM WATER STRUCTURE IT WILL SERVICE.

2. THE STORM DRAIN INLET PROTECTION SHALL HAVE A BUILT-IN HIGH-FLOW RELIEF SYSTEM (OVERFLOW BYPASS).

3. THE RETRIEVAL SYSTEM MUST ALLOW REMOVAL OF THE BELOW INLET GRADE DEVICE WITHOUT SPILLING THE COLLECTED MATERIAL.

4. PERFORM MAINTENANCE IN ACCORDANCE WITH DEPARTMENT OF ECOLOGY BMP C220.

STORM DRAIN INLET PROTECTION

SCALE: NTS

4 / LS-1

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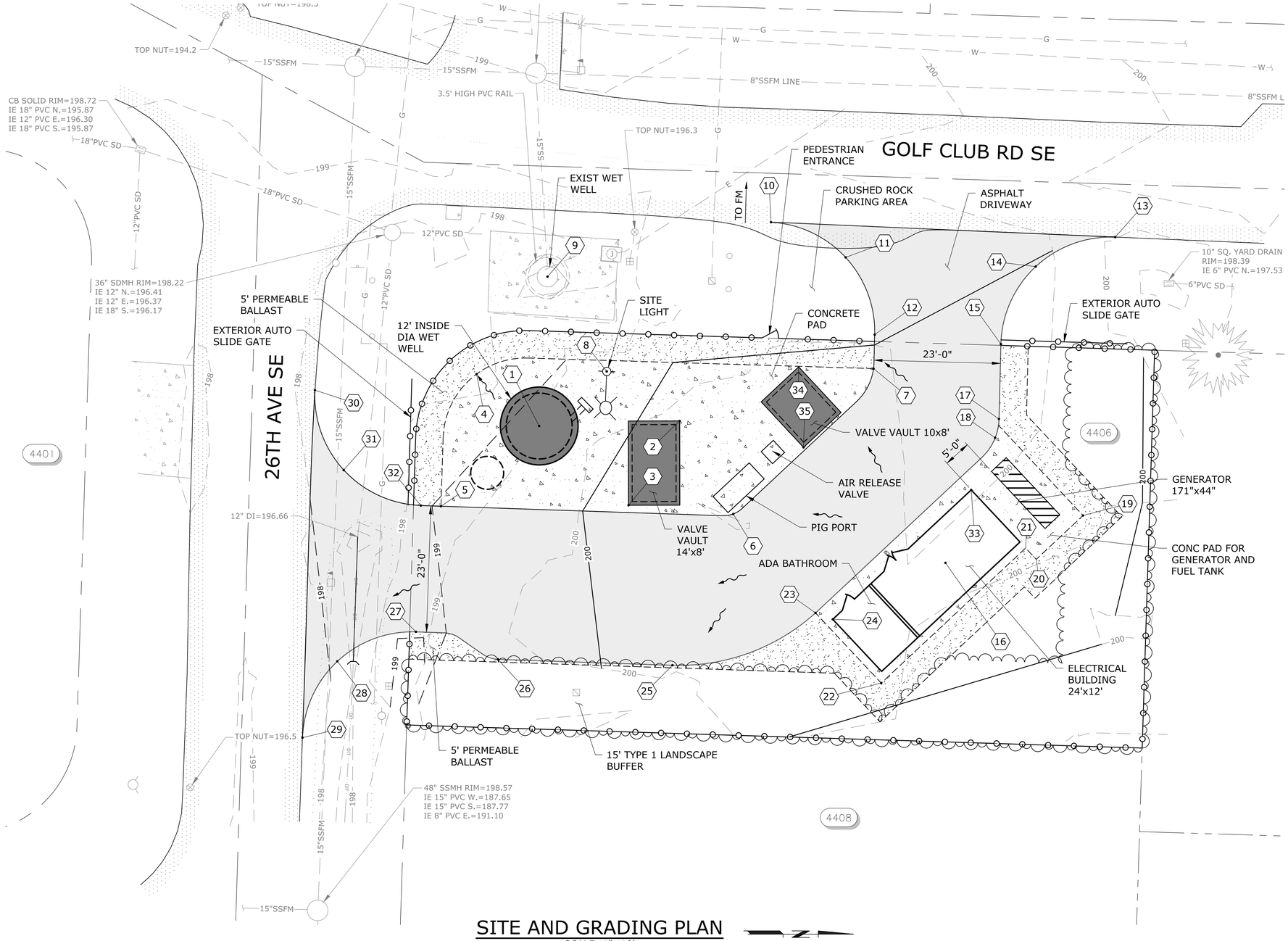
DEMOLITION DETAILS & NOTES

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET **LS-2**



SITE AND GRADING PLAN

SCALE: 1"=10'

GRADING POINTS

PT NO.	DESCRIPTION	NORTHING	EASTING	ELEVATION
1	CENTER WET WELL	N625464.54	E59889.84	199.60
2	NW EXT CORNER VAULT	N625490.12	E59888.92	200.07
3	SE EXT CORNER VAULT	N625480.81	E59904.27	200.07
4	SW CORNER OF CONC, RAD 15'	N625451.78	E59881.53	198.42
5	SE CORNER OF CONC	N625446.65	E59904.45	198.82
6	NE CORNER OF CONC, RAD 5'	N625499.88	E59905.86	199.52
7	NW CORNER OF CONC	N625525.43	E59879.39	199.90
8	SITE LIGHT POLE	N625476.84	E59879.91	199.28
9	CENTER OF EXIST WET WELL	N625466.05	E59862.65	198.51
10	NW DWY S @ EXIST RD	N625506.75	E59852.73	199.24
11	NW DWY S MID 20' RAD	N625520.35	E59859.14	199.20
12	NW DWY S INNER 20' RAD	N625525.64	E59873.21	199.47
13	NW DWY N @ EXIST RD	N625569.47	E59855.45	199.95
14	NW DWY N MID 20' RAD	N625554.95	E59860.81	199.46
15	NW DWY N INNER 20' RAD	N625548.61	E59874.92	200.20
16	ELECTRICAL BLDG FF	-	-	200.62
17	N EDGE ASPH, RAD 6'	N625548.26	E59888.55	200.44
18	W EDGE CONC	N625548.17	E59889.70	200.50
19	N EDGE CONC	N625563.57	E59906.14	200.50
20	NNE EDGE CONC	N625555.06	E59914.12	200.50
21	NEE EDGE CONC	N625553.13	E59912.05	200.52
22	E EDGE CONC	N625526.83	E59936.63	200.50
23	S EDGE CONC	N625514.86	E59923.86	200.50
24	S EXTERIOR CORNER OF BLDG	N625518.01	E59925.03	200.60
25	NE EDGE ASPH	N625488.80	E59933.39	199.51
26	SE EDGE OF ASPH	N625457.02	E59932.31	199.38
27	SE DWY E INNER 20' RAD	N625442.10	E59927.31	198.84
28	SE DWY E MID 20' RAD	N625427.78	E59932.67	198.32
29	SE DWY E @ EXIST RD	N625421.43	E59946.58	198.83
30	SE DWY W @ EXIST RD	N625423.70	E59883.31	198.43
31	SE DWY W MID 20' RAD	N625428.94	E59897.86	198.25
32	SE DWY W INNER 20' RAD	N625443.00	E59904.32	198.67
33	W EXTERIOR CORNER OF BLDG	N625543.21	E59901.47	200.60
34	W EXT CORNER VAULT	N625511.80	E59879.08	200.07
35	E EXT CORNER VAULT	N625512.68	E59893.73	200.07

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SITE AND GRADING PLAN

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SHEET
LS-3
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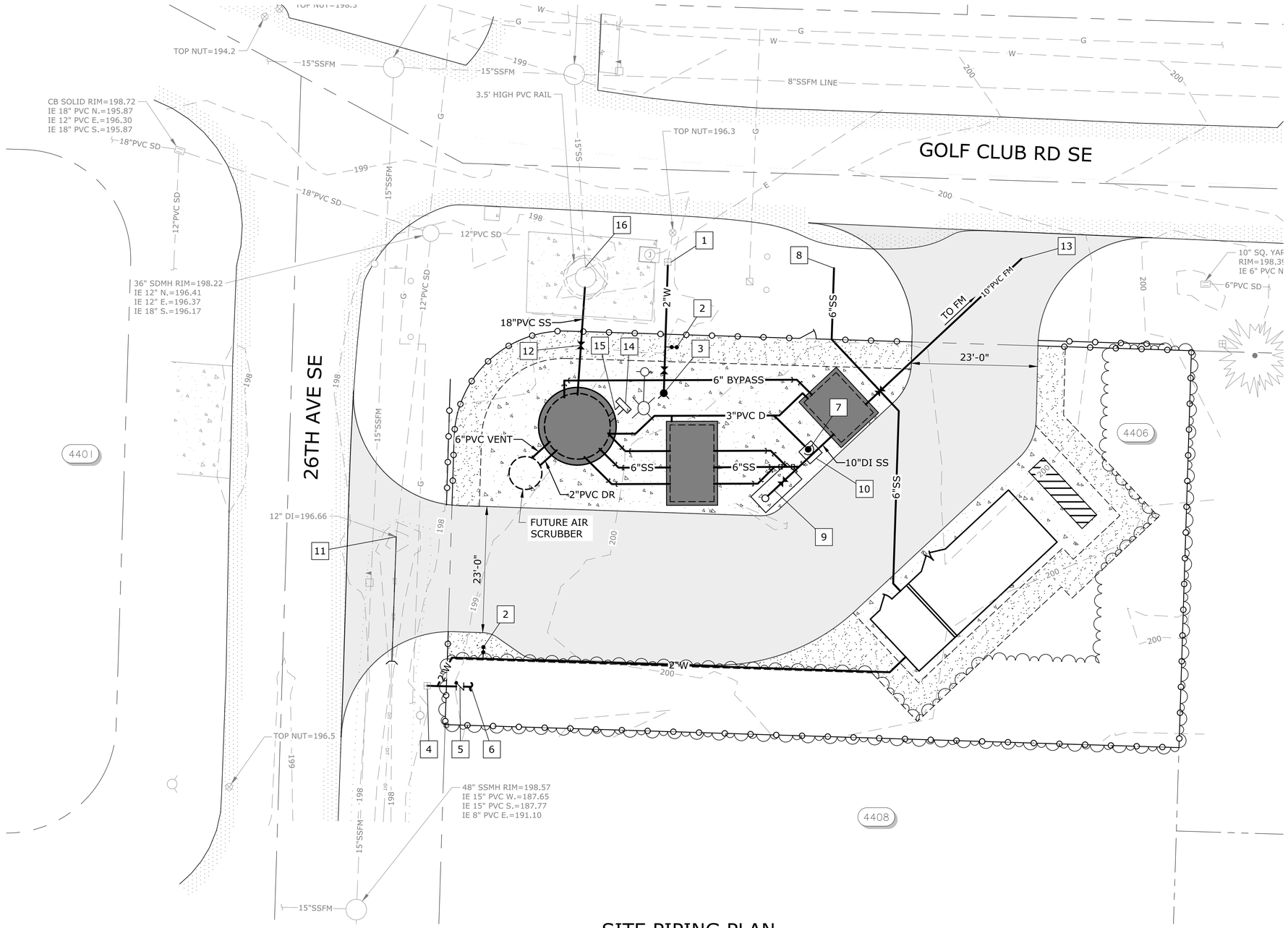

SITE PIPING PLAN
SCALE: 1"=10'

KEY NOTES:

1. CONNECT TO EXIST WATER SERVICE AND METER, FOR LIFT STATION WASH HYDRANT
2. 2" RPBA, SEE DET 1, SHT D-2
3. LIFT STATION WASH HYDRANT, SEE DET 2, SHT D-2
4. CONNECT TO EXIST WATER SERVICE, FOR IRRIGATION AND ELECTRICAL BUILDING
5. IRRIGATION DCVA, SEE DET 2, SHT D-4
6. IRRIGATION SYSTEM CONNECTION, SEE DET 3, SHT D-4
7. ROUTE 3" PVC DRAIN LINE TO ARV ENCLOSURE, FITTINGS AS REQD
8. INSTALL NEW 6" SEWER CONNECTION, SEE DET 2, SHT D-5
9. INSTALL 10" DI WYE W/ 10" PV, FLGxMJ ADAPTER AND 10" PIG LAUNCH PORT, INCLUDING 10" PV (SEE DET 1, SHT D-3) WITH TB
10. LIFT STATION 2" AIR AND VACUUM RELEASE VALVE INSTALLATION, SEE DET 2, SHT D-3. PROVIDE FITTINGS AND DISMANTLING JOINT AS REQUIRED FOR CONNECTION TO VENT PIPE
11. REPLACE EXIST STORM DRAIN PIPE UNDER NEW DRIVEWAY WITH 12" DI AND COUPLING AS REQ'D
12. INSTALL 18" GATE VALVE, MJ W/ VALVE OPERATOR EXTENSION, SEE DET 3, SHT D-3
13. CONNECT TO FM BY OTHERS
14. ISOLATION PEDESTAL, SEE DET 1, SHT D-5
15. CABLE TRENCH, SEE DET 1, SHT D-4
16. EXIST WET WELL WITH MODIFICATIONS, SEE DET 1, SHT LS-8

NOTES:

1. ALL DUCTILE IRON MECHANICAL JOINT FITTINGS, PIPE AND VALVES SHALL BE EPOXY COATED AND HAVE RESTRAINED JOINTS. FORCE MAIN FITTINGS SHALL INCLUDE THRUST BLOCKS, AS NOTED.
2. ALL PVC FORCE MAIN, INCLUDING FORCE MAIN DRAIN TO WET WELL, SHALL BE RESTRAINED JOINT PIPE.
3. PIPE TRENCH BEDDING AND BACKFILL SHALL BE IN ACCORDANCE WITH DETAIL 5 SHEET D-1.
4. INSTALL THRUST BLOCKS FOR ALL FORCE MAIN FITTINGS.
5. ALL DRAIN AND VENT PIPING SHALL BE SLOPED TO WET WELL AT 2% MIN SLOPE.
6. IRRIGATION SYSTEM NOT SHOWN FOR CLARITY, SEE LANDSCAPE PLANS.

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SITE PIPING PLAN

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SHEET
LS-4
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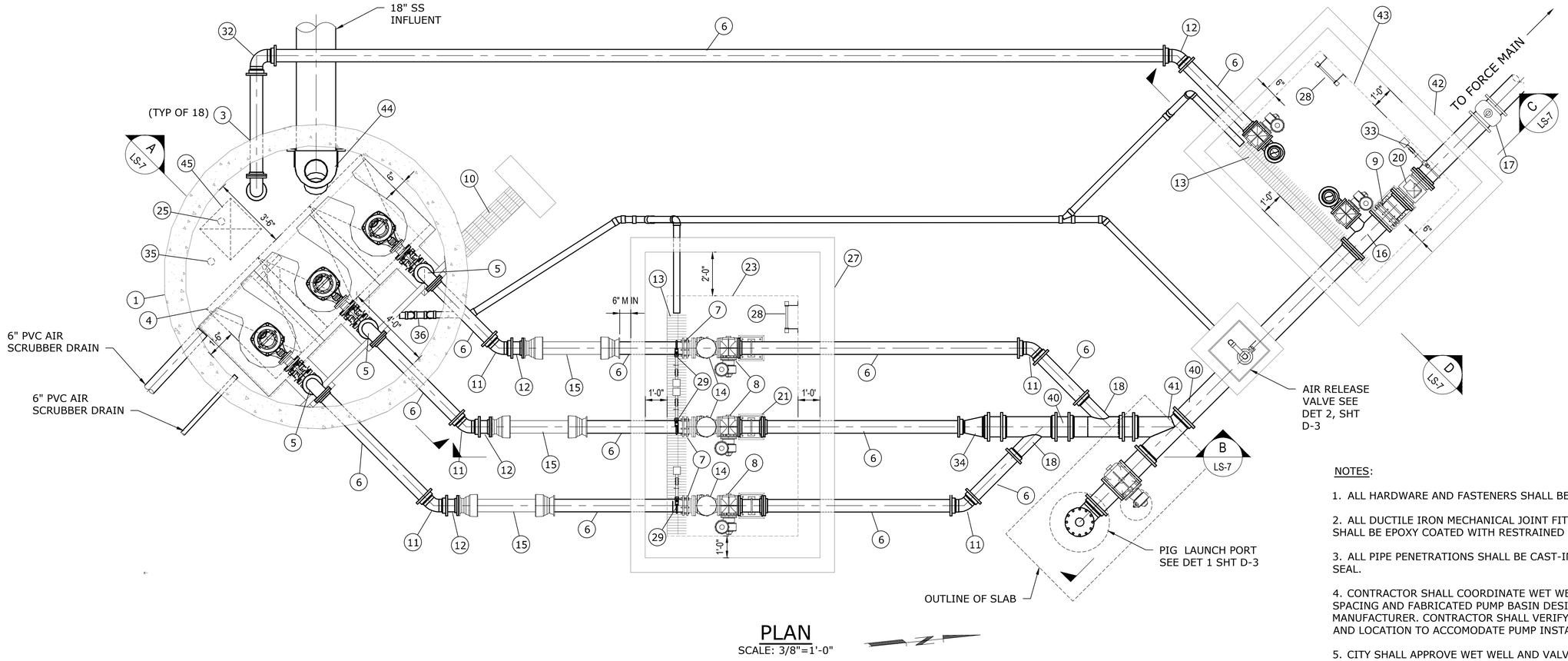

PLAN
SCALE: 3/8"=1'-0"

NOTES:

1. ALL HARDWARE AND FASTENERS SHALL BE 316 STAINLESS STEEL.
2. ALL DUCTILE IRON MECHANICAL JOINT FITTINGS, PIPE AND VALVES SHALL BE EPOXY COATED WITH RESTRAINED JOINTS.
3. ALL PIPE PENETRATIONS SHALL BE CAST-IN AND SEALED WITH LINK SEAL.
4. CONTRACTOR SHALL COORDINATE WET WELL LAYOUT, PUMP SPACING AND FABRICATED PUMP BASIN DESIGN WITH PUMP AND BASIN MANUFACTURER. CONTRACTOR SHALL VERIFY WET WELL HATCH SIZING AND LOCATION TO ACCOMODATE PUMP INSTALLATION AND REMOVAL
5. CITY SHALL APPROVE WET WELL AND VALVE VAULT STRUCTURE WALL CORE LAYOUT FOR PIPES AND CONDUITS.

MATERIAL LIST

1. 12' INSIDE DIA PRECAST CONC WET WELL AND BASE W/ SPRAY ROQ COATING IN ACCORDANCE W/ SPECS AND SHT G-4
2. SUBMERSIBLE WASTEWATER PUMP HIDROSTAL E4K-S (TYP OF 4)
3. LINK-SEAL WALL PENETRATION, SEE DET 2, SHT LS-9
4. 54" x 120" ALUM TRIPLE-LEAF ACCESS HATCH, H20 RATED, SEE DET 1, SHT LS-10
5. 6" DI 90° BEND, FLG
6. 6" DI SPL, FLG OR PE AS SHOWN, LTF
7. 6" RFCA
8. 6" EPOXY COATED PV W/ HANDWHEEL, FLG
9. 10" RFCA
10. 4"x8" WIDE TRENCH CABLE TRAY W/ PERFORATED GRIP STRUT LID, SEE DET 1, SHT D-4
11. 6" DI BEND 45°, MJ
12. 6" DI SPOOL PE x FLG
13. SUMP W/AL GRATING BY VAULT MFR
14. 6" EPOXY COATED SWING CHECK VALVE W/ LIMIT SWITCH, SEE DET 3, SHT L-9
15. 6" FLEXIBLE EXPANSION JOINTS 12" OFFSET FLG X MJ
16. 10" x 6" DI TEE, FLG
17. 10" GV, MJ
18. 10" x 6" DI WYE, MJ
19. 6" 316 SS CAMLOCK FITTING W/ CAP & INSULATING FLANGE KIT (TYP OF 2).
20. 10" FLOW METER, FLG
21. PIPE SUPPORT, STANDON MODEL S89 OR EQ, INSTALL AS NEEDED (4 MIN)
22. 4" PUMP BASE ELBOW, FLG
23. 72" x 132" ALUM DOUBLE-LEAF ACCESS HATCH SEE DET 1, SHT LS-10
24. 2" DIA SST TYPE 316 GUIDE RAIL, TYP OF 6, INSTALL AS REQ'D BY MFR
25. ULTRASONIC LEVEL TRANSDUCER, SEE SHT E-X
26. PIPE SUPPORT BRACKET, SEE DET 4, SHT LS-9 AND DET 6, SHT LS-9
27. 8' x 14' x 4' PRECAST CONC SOLID WALL VAULT, UTILITY VAULT OR APPVD EQ
28. OSHA APPVD LADDER W/ EXTENSION, SEE DET 7, DET 1, SHT LS-10
29. ½" TAP W/ SST BALL VALVE W/ 0-30 PSI GAUGE
30. FABRICATED PUMP BASIN BY PUMP MFR W/ GROUT FILL, SEE NOTE 5
31. WET WELL HATCH SAFETY RAIL, SEE DET 2, SHT LS-10
32. 6" DI 90° BEND, MJ
33. PRESSURE TRANSMITTER ASSEMBLY (0-30 PSI), SEE SHT E-X
34. 10" X 6" DI CONCENTRIC RDCR, MJ
35. HIGH LEVEL FLOAT
36. P-TRAP, SEE DET 1, SHT LS-9
37. 6" DI BASE ELBOW FLG (TYP OF 2)
38. 6" x 4" ECC DI REDUCER, FLG
39. BASE ELBOW SUPPORT (TYP OF 2) SEE SHT X, DTL X
40. 10" DI SPL, FLG x PE AS SHOWN, LTF
41. 10" DI WYE, MJ
42. 8' x 10' x 4' PRECAST CONC SOLID WALL VAULT, UTILITY VAULT OR APPROVED EQUAL
43. 72" x 108" ALUM DOUBLE-LEAF ACCESS HATCH H-20 RATED SEE DET 1, SHT LS-10
44. DROP BOWL, SEE DET 5, SHT LS-9
45. 24 x 24" ALUM SINGLE-LEAF ACCESS HATCH, H-20 RATED, SEE DET 1, SHT LS-10

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WET WELL & VALVE VAULT PLAN

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
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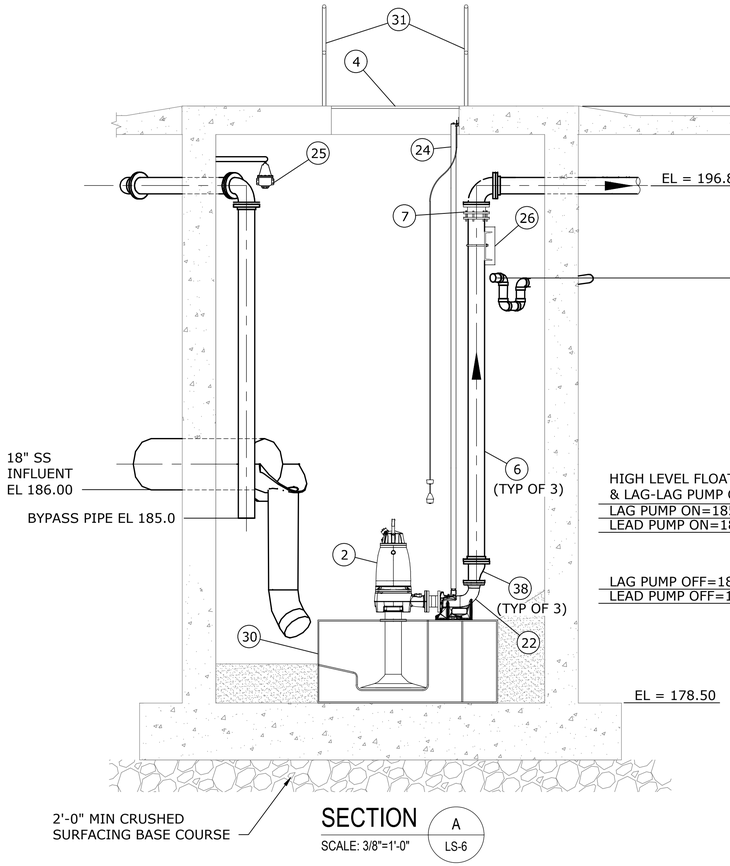
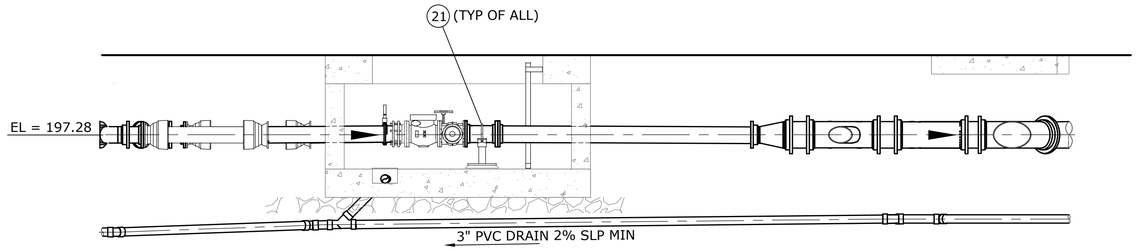
MATERIAL LIST

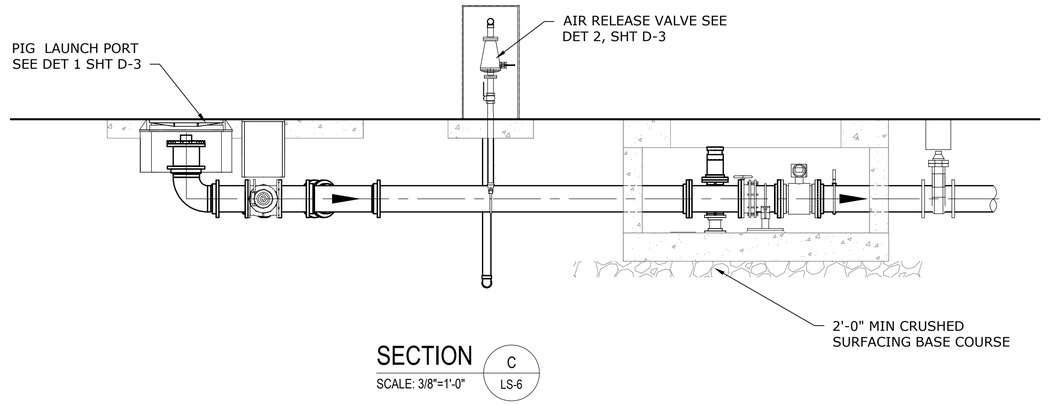
SEE SHT LS-6 FOR MATERIAL LIST AND NOTES.



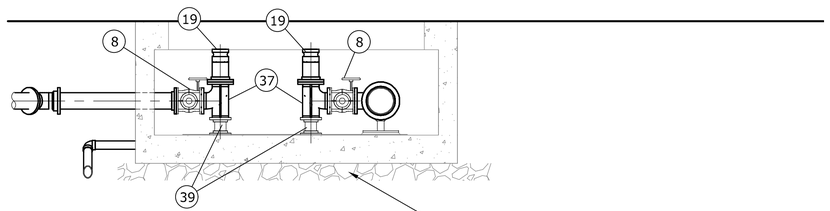
SECTION A
SCALE: 3/8"=1'-0"



SECTION B
SCALE: 3/8"=1'-0"



SECTION C
SCALE: 3/8"=1'-0"



SECTION D
SCALE: 3/8"=1'-0"

WET WELL LEVELS

DESCRIPTION	ELEVATION (FT)	WET WELL LEVEL (FT)
WET WELL RIM	199.50	21.00
INFLUENT SEWER	186.00	7.50
HIGH LEVEL FLOAT	185.50	7.00
LAG-LAG PUMP CALL	185.50	7.00
SCADA ALARM	185.25	6.75
BYPASS PIPE	185.00	6.50
LAG PUMP ON	185.00	6.50
LEAD PUMP ON	184.50	6.00
LAG PUMP OFF	182.50	4.00
LEAD PUMP OFF	182.00	3.50
LOW LEVEL ALARM	181.50	3.00
WET WELL BOTTOM	178.50	0.00

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WET WELL & VALVE VAULT SECTION

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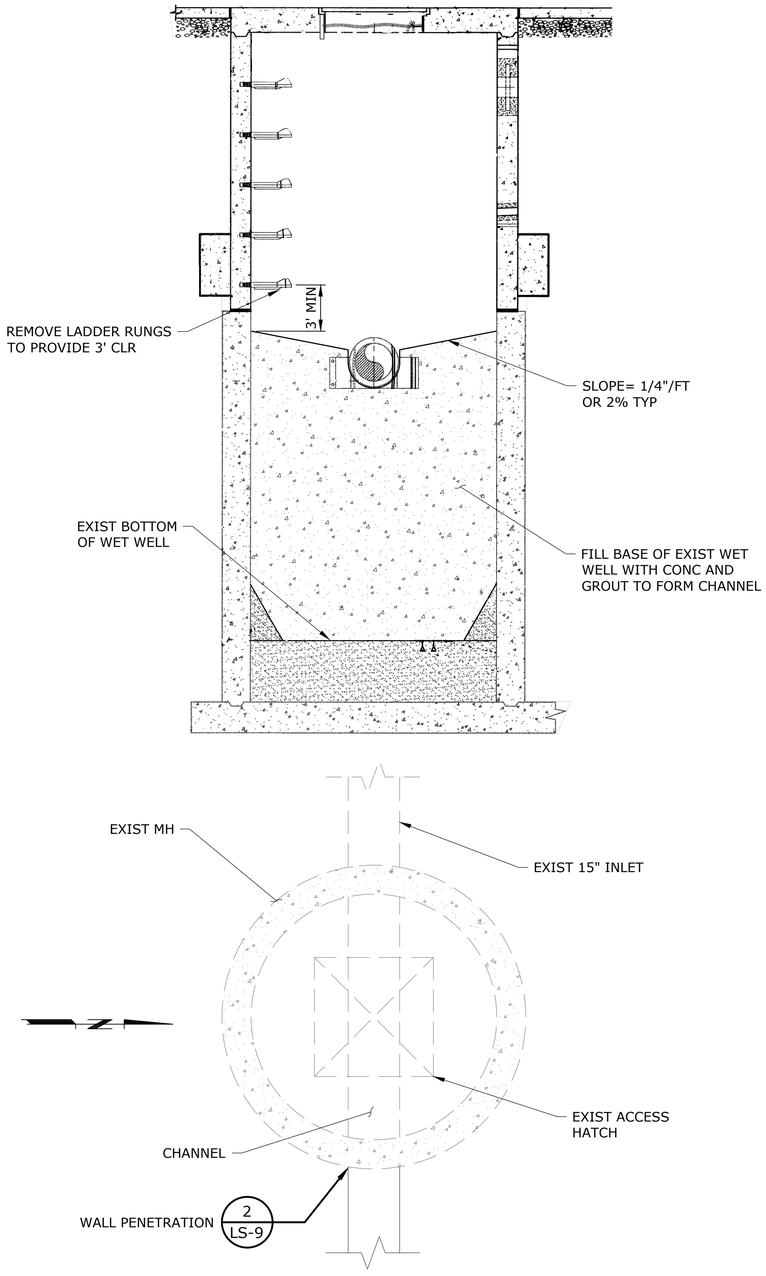

EXIST WET WELL MODIFICATIONS (1 / LS-4)

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CIVIL DETAILS

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET **LS-8**

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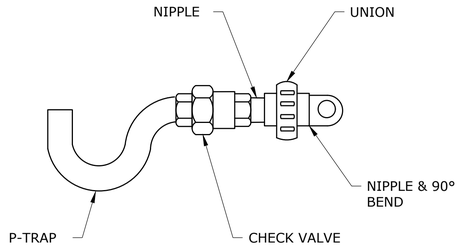
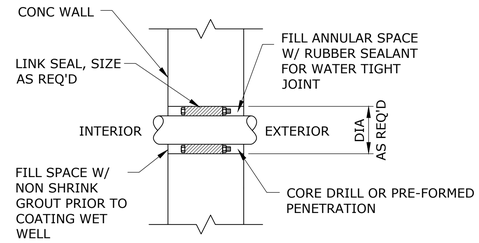


P-TRAP DETAIL

SCALE: NTS

1 / LS-6



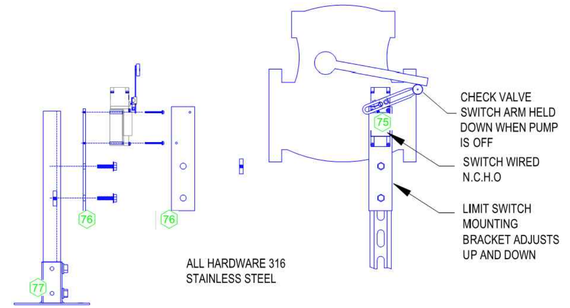
NOTE:

1. SEAL ALL WALL PIPE AND CONDUIT PENETRATIONS WITH LINK SEAL TYPE SEAL.

WALL PENETRATION

SCALE: NTS

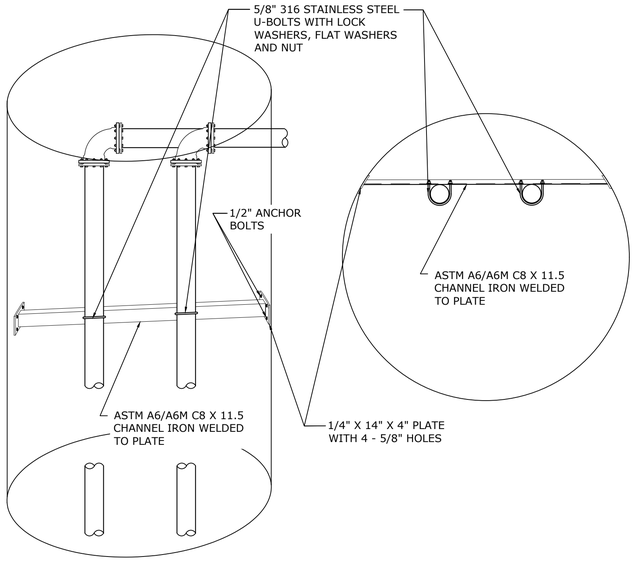
2 / LS-6 LS-8



SWING CHECK VALVE

SCALE: NTS

3 / LS-6



NOTES:

1. CHANNEL IRON SUPPORT AND BRACKETS SHALL BE COATED WITH 3M SCOTCH COAT 134 FUSION BONDED EPOXY.

2. 316 STAINLESS STEEL SUPPORT OF SAME DIMENSIONS SHOWN MAY BE SUBSTITUTED FOR EPOXY COATING IF DESIRED.

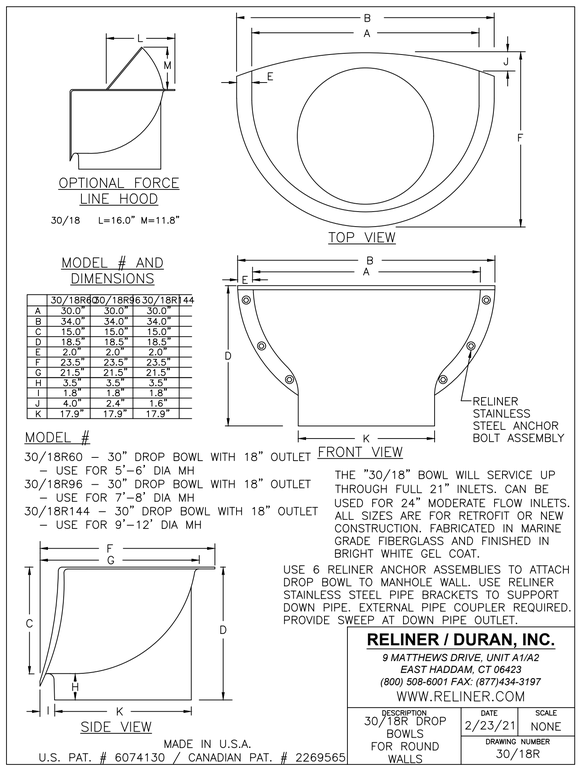
3. ALL BOLTS, ANCHORS AND FASTENERS SHALL BE 316 STAINLESS STEEL.

4. THERE SHALL BE ONE PIPE SUPPORT BAR INSTALLED FOR EACH 10' OF VERTICAL DISCHARGE PIPE. NO SUPPORTS SHALL BE INSTALLED BELOW THE LAG PUMP LEVEL.

TYPICAL LIFT STATION PUMP PIPE SUPPORT

SCALE: NTS

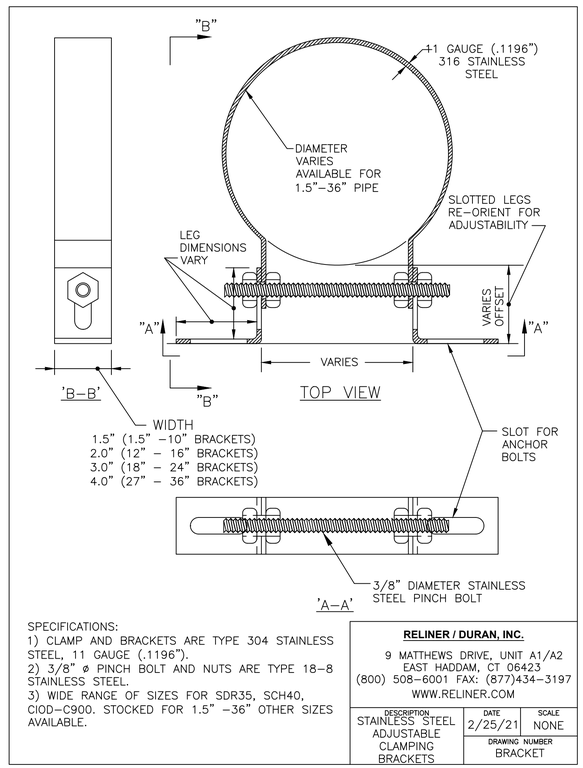
4 / LS-6 LS-7



DROP BOWL

SCALE: NTS

5 / LS-6 LS-7



PIPE BRACKETS

SCALE: NTS

6 / LS-6 LS-7

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MECHANICAL DETAILS - 1

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SHEET
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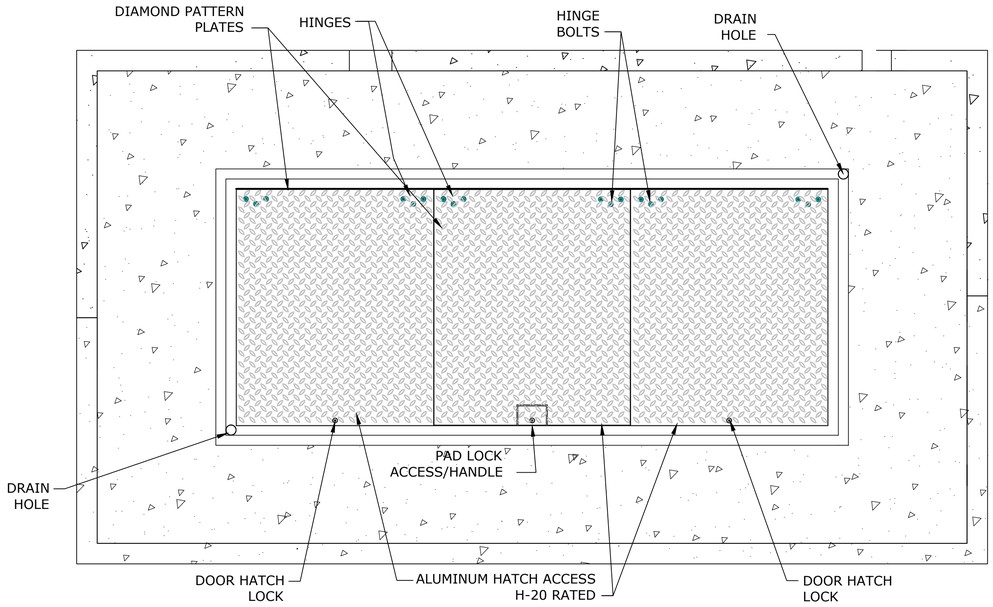


NOTES:

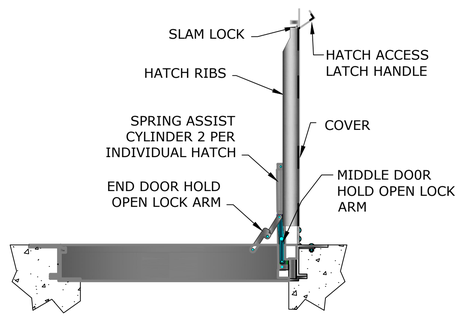
1. THE ACCESS SHALL BE LW PRODUCTS HATCH, WITH SLAM LOCK, SPRING ASSISTED CYLINDER, HOLD OPEN ARM, BEARING SHELF AND DRAIN GUTTER DESIGNED FOR H-20 LOADING.

2. THE ACCESS HATCH SHALL OPEN AS DETERMINED DURING THE REVIEW.

3. VAULT SHALL HAVE BILCO LU1 LADDER UP SAFETY POST WITH YELLOW EPOXY COATING AND MOUNTED TO THE LADDER.

4. ALL PENETRATIONS INTO THE VAULT SHALL BE CORE DRILLED AND SECURED/SEALED WITH LINK SEAL.

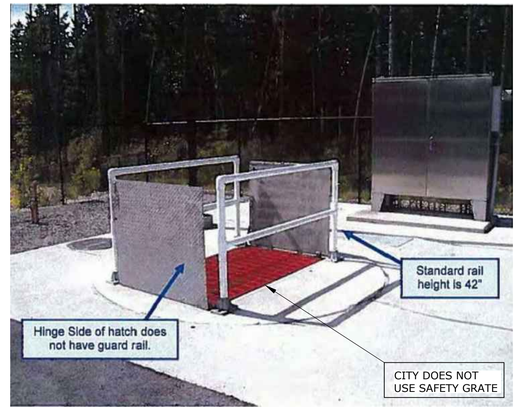
5. HATCH CLEAR OPENING SHALL BE WATER TIGHT.



ACCESS HATCH DETAIL

SCALE: NTS

1 / LS-6 → LS-7



NOTES:

1. RAILS MUST BE KEE SAFETY RAILING SOLUTIONS. SIMPLIFIED BUILDING CONCEPTS, (888) 527-2278.

2. RAILS SHALL BE STEEL, 2" DIAMETER, POWDER COATED WHITE.

3. MOUNTING BOLTS / CONCRETE, FASTENERS SHALL BE STAINLESS STEEL.

4. CITY DOES NOT USE SAFETY GRATE.

WET WELL GUARD RAIL SYSTEM

SCALE: NTS

2 / LS-6 → LS-7

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MECHANICAL DETAILS - 2

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SHEET
LS-10
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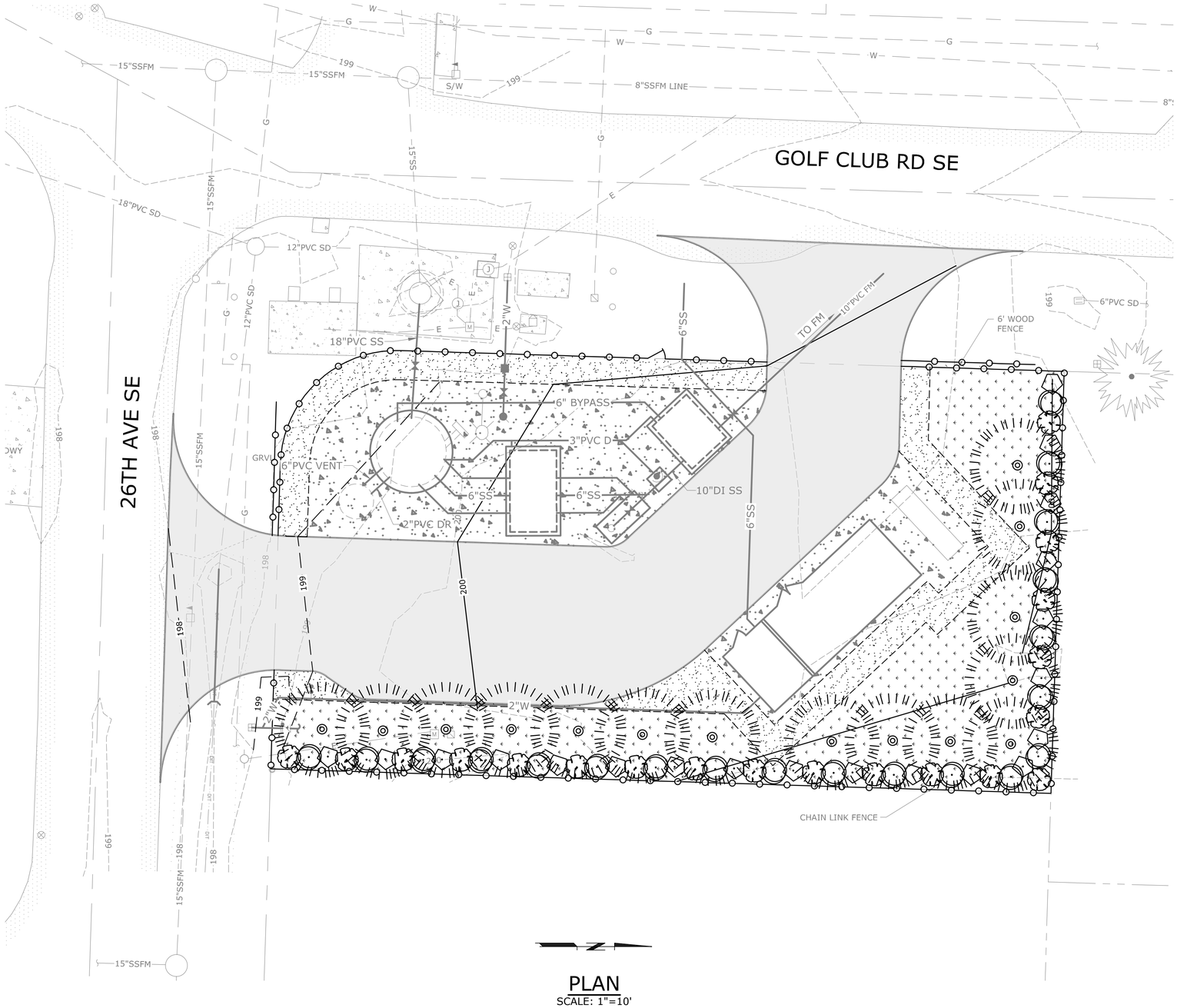

PLAN
SCALE: 1"=10'

LEGEND

SYMBOL	QUANTITY	COMMON NAME BOTANICAL NAME	PLANT TYPE	PLANTING SIZE	LOCATION
	15	YEW TAXUS BREVIFOLIA	TREE	7 FT	AS SHOWN
	20	REDOSIER DOGWOOD CORNUS SERICEA	SHRUB	2 GAL	AS SHOWN
	20	TALL OREGON GRAPE MAHONIA AQUIFOLIUM	SHRUB	2 GAL	AS SHOWN
	20	SALMONBERRY RUBUS SPECTABILIS	SHRUB	2 GAL	AS SHOWN
	3 LB	SEEDING AREA, 2761 SF SEE DETAILS, SHEET L-2			
		EXISTING TREES			

NOTE:

1. SEE PLANTING DETAILS AND LANDSCAPE MAINTENANCE NOTES AT SHEET L-2.

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PLANTING PLAN

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
L-1
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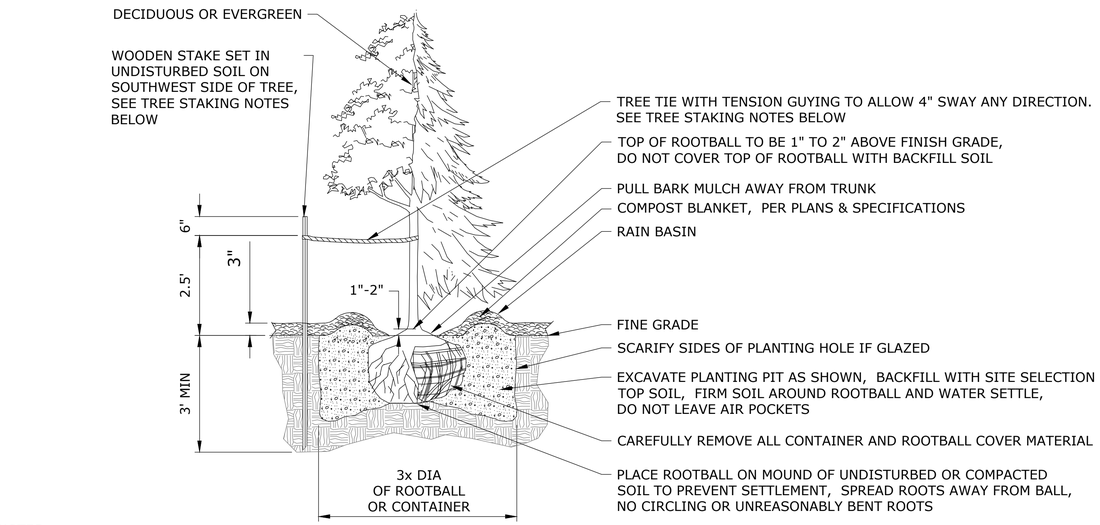


NOTES:

1. TREE TIES TO BE EITHER:

   RIGID GUY SYSTEM WITH GALVANIZED WIRE TO BE APPROXIMATELY 1/8" THICKNESS AND 24" LENGTH. THERE IS A PLASTIC SLEEVE OVER PORTION THAT GOES AROUND TREE. THE WIRE TIE IS TO GO THRU THE WOOD STAKE AND BE SECURELY FASTENED.

   PLASTIC CHAIN TYPE, APPROXIMATELY 1" WIDTH BY 1/8" DEPTH WHERE TWO STAKES ARE REQUIRED. CROSS TIES BETWEEN STAKES AND WRAP TIE AROUND TREE. FASTEN SECURELY TO STAKE.

2. EXCAVATE ALL PLANT WELLS PER DETAIL AT 3X DIAMETER OF ROOTBALL OR CONTAINER AND BACKFILL WITH SITE SELECT TOPSOIL FREE OF NOXIOUS WEEDS PLANT MATERIAL INCLUDING ROOTS AND SPRIGS.

3. FURNISH TREE STAKES ON ALL TREE PLANTINGS. STAKES TO BE CONSTRUCTION GRADE, ROUGH SAWN OR FINISHED DOUGLAS FIR OR PINE. STAIN WITH APPROVED GREEN PENETRATING OIL. STAKE SIZE IS TO BE 1 1⁄2"x1-1/2" BY FOLLOWING LENGTHS:

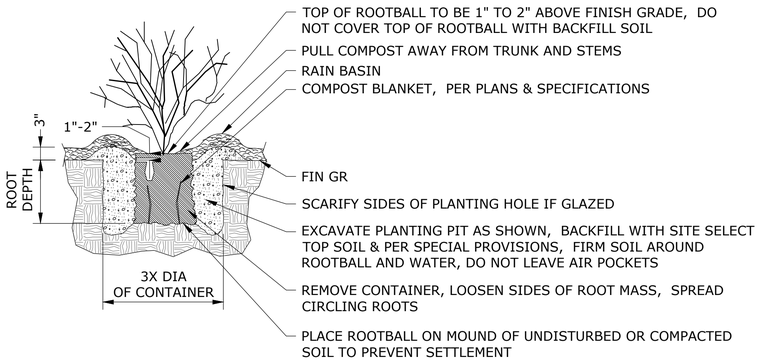
   TREES 36" AND SHORTER - USE ONE - 6' (APPROXIMATELY) STAKE

   TREES TALLER THAN 36" - USE ONE - 8' (APPROXIMATELY) STAKE

   DRIVE STAKES VERTICALLY AND AT LEAST 24" INTO UNDISTURBED SOIL. DO NOT DRIVE STAKES THRU ROOT BALL. LOCATE STAKES TO BEST RESIST PREVAILING WINDS.

TREE PLANTING DETAIL 1/-

SCALE: NTS



SHRUB PLANTING DETAIL 2/-

SCALE: NTS

PLANTING METHODS:

1. SOIL PREPARATION: TILL THE SUB-GRADE IN THESE AREAS TO A DEPTH OF AT LEAST FOUR INCHES AND ADD AT LEAST 12 INCHES OF CLEAN COMPOST-AMENDED TOPSOIL. THE COMPOST-AMENDED TOPSOIL SHALL HAVE A GOOD GROWING MEDIUM WITH TEXTURE MATERIAL THAT PASSES THROUGH ONE-INCH AND 35% ORGANIC MATTER FERTILITY.

2. PLANTING TIME: CONTAINERIZED STOCK SHALL BE INSTALLED ONLY FROM FEBRUARY 1 THROUGH MAY 1 AND OCTOBER 1 THROUGH NOVEMBER 15. PLANTINGS OUTSIDE THESE TIMES MAY REQUIRE ADDITIONAL MEASURES TO ENSURE SURVIVAL WHICH SHALL BE SPECIFIED ON THE PLANS.

3. INSTALLED PLANTS SHALL TAGGED FOR DORMANT SEASON IDENTIFICATION AND SHALL REMAIN ON PLANT MATERIALS AFTER PLANTING FOR MONITORING PURPOSES.

4. EROSION CONTROL: GRADING, SOIL PREPARATION, AND SEEDING SHALL BE PERFORMED DURING OPTIMAL WEATHER CONDITIONS AND AT LOW FLOW LEVELS TO MINIMIZE SEDIMENT IMPACTS.

5. MULCHING: TREES, SHRUBS, AND GROUNDCOVER AREAS SHALL BE MULCHED A MINIMUM OF THREE INCHES IN DEPTH AND 18 INCHES IN DIAMETER, TO RETAIN MOISTURE AND DISCOURAGE WEED GROWTH AROUND NEWLY INSTALLED PLANT MATERIAL. APPROPRIATE MULCHES ARE MADE FROM COMPOSTED BARK OR LEAVES THAT HAVE NOT BEEN CHEMICALLY TREATED.

6. WEED CONTROL: THE REMOVAL OF NON-NATIVE, INVASIVE WEEDS SHALL BE NECESSARY THROUGHOUT THE MAINTENANCE PERIOD, OR UNTIL A HEALTHY STAND OF DESIRABLE VEGETATION IS ESTABLISHED.

8. PLANT REPLACEMENT AND PRESERVATION: INSTALLED PLANTS THAT ARE UNHEALTHY OR DAMAGED SHALL BE REPLACED DURING THE MAINTENANCE PERIOD. PRIOR TO REPLACEMENT, THE CAUSE OF LOSS (WILDLIFE DAMAGE, POOR PLANT STOCK, ETC.) SHALL BE DOCUMENTED WITH A DESCRIPTION OF THE CORRECTIVE ACTIONS TAKEN.

9. IF PLANTING OCCURRED OUT OF PLANTING PERIODS INDICATED AT NOTE 2 ABOVE, THE FOLLOWING MEASURES SHOULD BE APPLIED:

A. HAVE PLANTS INSPECTED FOR EARLY SYMPTOMS OF POOR HEALTH. TREES AFFECTED BY EARLY STAGES OF STRESS COULD DISPLAY PREMATURE FALL COLOR IN LATE SUMMER, PARTIAL DEFOLIATION AND SYMPTOMS OF MOISTURE STRESS.
B. PROVIDE SUPPLEMENTAL IRRIGATION EACH WEEK OR MORE OFTEN ON NEWLY PLANTED TREES, SHRUBS AND OLDER PLANTS STRESSED WITH INSECT OR DISEASE PROBLEMS WHEN RAINFALL IS LACKING IN SUMMER.
C. PRUNE FLOWERING TREES AND SHRUBS ONCE FLOWER BUDS BEGIN TO FORM IN LATE SUMMER, JUDICIOUS PRUNING REDUCES THE BLOOM SOMEWHAT BUT SHOULD NOT IMPACT THE DISPLAY SIGNIFICANTLY.
D. INSPECT FOR PESTS THAT COMMONLY ARRIVE DURING HOT, DRY WEATHER AND APPLY TREATMENTS AS NEEDED.
E. ASSESS CANOPIES FOR DEAD BRANCHES AND STRUCTURAL WEAKNESSES THAT CAN BE PRUNED LATER IN WINTER.

PLANTS MAINTENANCE NOTES:

1. CONTRACTOR SHALL PROVIDE 2 YEARS PLANT ESTABLISHMENT PERIOD TO MAINTAIN PLANTS IN A VIGOROUS GROWING CONDITION THROUGH WATERING AND PERIODIC INSPECTIONS. DURING PLANT ESTABLISHMENT PERIOD, THE CONTRACTOR SHALL ENSURE PLANTING AREAS ARE FREE OF INVASIVE WEEDS AND PLANTS SHALL BE FREE OF INSECTS AND DISEASES WHILE SHOWING SIGNS OF CONTINUING HEALTH. THE CONTRACTOR SHALL REPLACE ALL PLANTS THAT SHOW UNHEALTHY SIGNS OR ARE DEAD.

3. THE MAINTENANCE PERIOD BEGINS IMMEDIATELY AFTER THE COMPLETION OF ALL PLANTING OPERATION AND WRITTEN NOTIFICATION TO THE ENGINEER.

4. OTHER MAINTENANCE OPERATIONS DURING THE ONE-YEAR GUARANTEE PERIOD:

- RESET PLANTS TO FINISH GRADE AND RESTORATION OF PLANT SAUCERS, AS NECESSARY
- REPAIR DAMAGED OR WASHED OUT EROSION CONTROL SEEDING.
- PRUNING, INCLUDING REMOVAL OF DEAD OR BROKEN BRANCHES.
- DISEASE CONTROL.
- MAINTAINING WRAPPING, GUYS, [TURNBUCKLES,] AND STAKES. [ADJUST TURNBUCKLES TO KEEP GUY WIRES TIGHT.] REPAIR OR REPLACE ACCESSORIES WHEN REQUIRED.
- REPORT ANY PROBLEMS THAT MAY BE A HINDRANCE TO COMPLETING AND FULFILLING THE CONDITIONS OF THE PLANT GUARANTEE WITHIN 7 DAYS TO THE OWNER.

SEEDING AREA

SEED MIX:

BOTANICAL NAME	COMMON NAME	PLS LBS. PER ACRE
ELYMUS GLAUCUS	BLUE WILDRYE	21.74
FESTUCA RUBRA RUBRA	NATIVE WILD FESCUE	6.52
HORDEUM BRACHYANTHERUM	MEADOW BARLEY	4.35
GLYCERIA OCCIDENTALLIS	WESTERN MANNAGRASS	4.35
BECKMANI SYZIGACHNE	AMERICAN SLOUGHGRASS	4.35
DESCHAMPSIA CAESPITOSA	TUFTED HAIRGRASS	2.17
	TOTAL	43.38

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PLANTING DETAILS

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
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CODE SUMMARY

Section I - Governing Codes
2018 IBC & CHAPTER 51-50 WAC, 2018 UPC & CHAPTER 51-50 WAC, THURSTON COUNTY AMENDMENTS
2018 IECC COMMERCIAL PROVISIONS & CHAPTER 51-11C WAC

Section II - Building "Construction" Data	
Type of Construction	Type VB - CMU, Wood Rafters
Maximum Building Height	19'5" ft (to roof ridge)
Maximum Allowable Height	35 ft, LMC 16.12
Number of Stories	1 story
Allowable Stories	2 Stories
Basement	No
Total Floor Area Provided (Gross)	384 sf
Minimum Required Property Setbacks	
Front Yard	16 ft, LMC 16.12.050
Side Yard	5 ft, LMC 16.12.050
Rear Yard	20 ft, LMC 16.12.050

Section III - Building "Occupancy" Data	
Building Occupancy Classification Group	F-2 Control Room
Separated or Unseparated Use Areas	Separated
Accessory or Incidental Use Areas	N/A
Total Occupant Load by Floor	Not Customarily Occupied
Total Occupant Load for Each Room	Not Customarily Occupied
Total Occupant Load for Each Occupancy Group	Not Customarily Occupied

Section IV Building Area Data "Actual" and "Allowable"	
Actual Building Area	384 sf
Allowable Base Area	6,000 sf
Building Frontage	See Sheet A-3

Section V - "Fire Resistive" Building Elements	
Separation of Occupancies	No Separation Requirement

Section VI - Building "Existing"	
Maximum Floor Area Allowance per Occupant	Not Customarily Occupied
Exits Required in Each Room or Area	1
Exits Provided in Each Room or Area	1
Exits Required per Floor	2
Exits Provided per Floor	2
Exit Width Required per Exit	32 inches
Minimum Corridor Exit Width Required	30 inches
Emergency Exit Illumination	See Sheet E-X
Exit Sign Layout Plan	See Sheet E-X

Section VII - Building "Fire Detection and Suppression"	
Smoke Detection/Fire Alarm System Required	No, IBC 907.2.4
Smoke Detection/Fire Alarm System Provided	Yes
Type of System	Ionization Smoke Detector
Areas Protected	All
Sprinkler System Required	No
Standpipe System Required	No
Number of Fire Department Vehicle Accesses	2
Fire Extinguisher Locations	TBD

Section VIII - Occupancy Ventilation Requirements	
Ventilation Required	Natural ventilation area > 4% of floor area
Ventilation Provided	Natural (door) = 10% of floor area

Section IX - Energy Code Requirements		
Space		
Roof - Above deck rigid insulation	R=30	U=0.027
Doors (Steel door with polystyrene core)	R=5	U=0.37
Mass floor	R=30	F=0.54
CMU walls with integral perlite insulation	N/A	
Skylights	N/A	
Lighting Layout	See Sheet E-X	

Section X - Hazardous Materials	
Hazardous materials present	None

Section XI - Accessibility
Facility is exempt from accessibility requirements per 2018 IBC 1103.2.9
ADA bathroom provided

Section XII - Plumbing and Fixture Count Requirements	
Plumbing Fixtures Required	None - not customarily occupied
Plumbing Fixtures Provided	One toilet, One sink provided

Section XIII - Underground and Padmounted Transformers
See Sheet E-X

Section XIV - Special Inspection, Structural Observation
Required Structural Inspections are listed on Sheet S-1
Structural Observation requirements are indicated on Sheet S-1
Submittals are listed in specifications

Section XV - Room Specific Requirements
Not Applicable - Not Customarily Occupied

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PETER S. MURRAY
48352
REGISTERED PROFESSIONAL ENGINEER
STATE OF WASHINGTON
February 4, 2022

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CITY OF LACEY

CITY OF LACEY
LIFT STATION NO. 3 REPLACEMENT

GENERAL ARCHITECTURAL NOTES & CODE SUMMARY

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
A-1
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ARCHITECTURAL GENERAL NOTES:

1. ALL WORK SHALL CONFORM TO THE MOST RECENT VERSION OF THE I.B.C., THE WASHINGTON STATE BUILDING CODE, WASHINGTON STATE ENERGY CODE, AS WELL AS ALL LOCAL JURISDICTION RULES AND REGULATIONS.

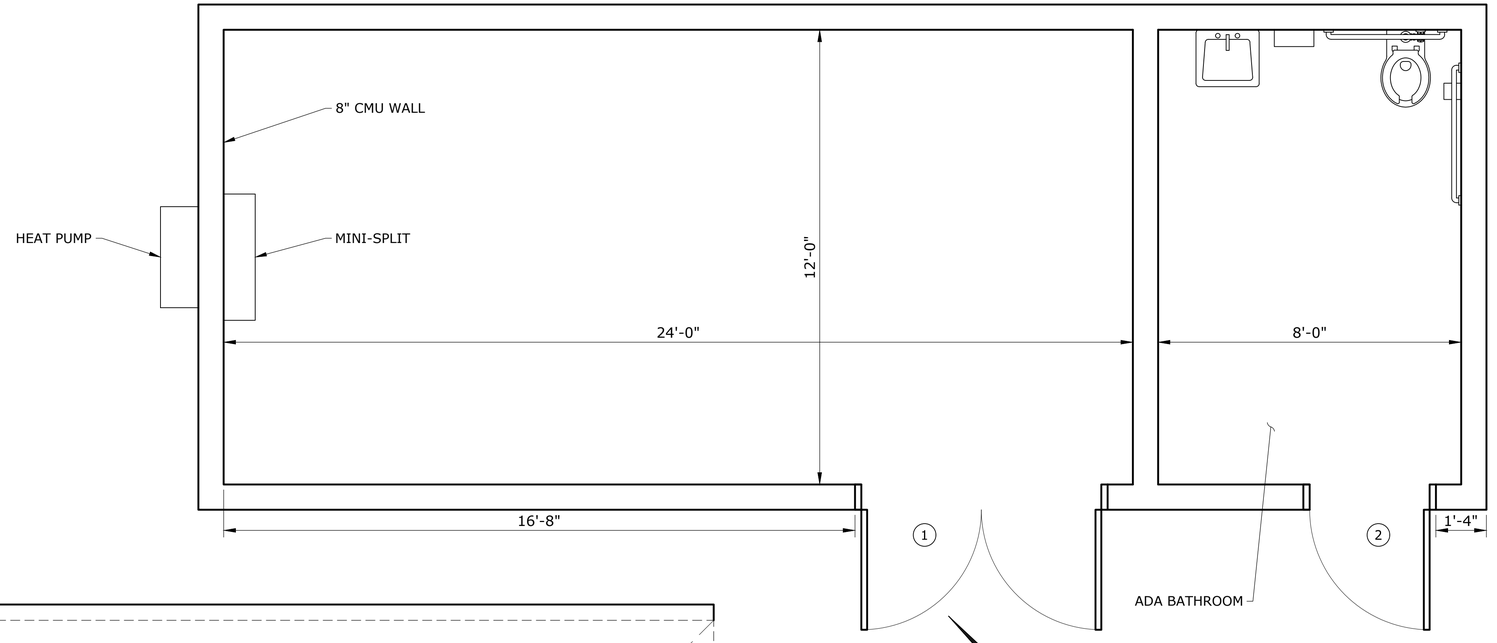
2. DIMENSIONS ARE TO FACE OF MASONRY, STUD / FRAMING UNLESS OTHERWISE INDICATED.

3. PROVIDE SEISMIC BRACING OF ALL EQUIPMENT, AS REQUIRED BY THE BUILDING CODE.

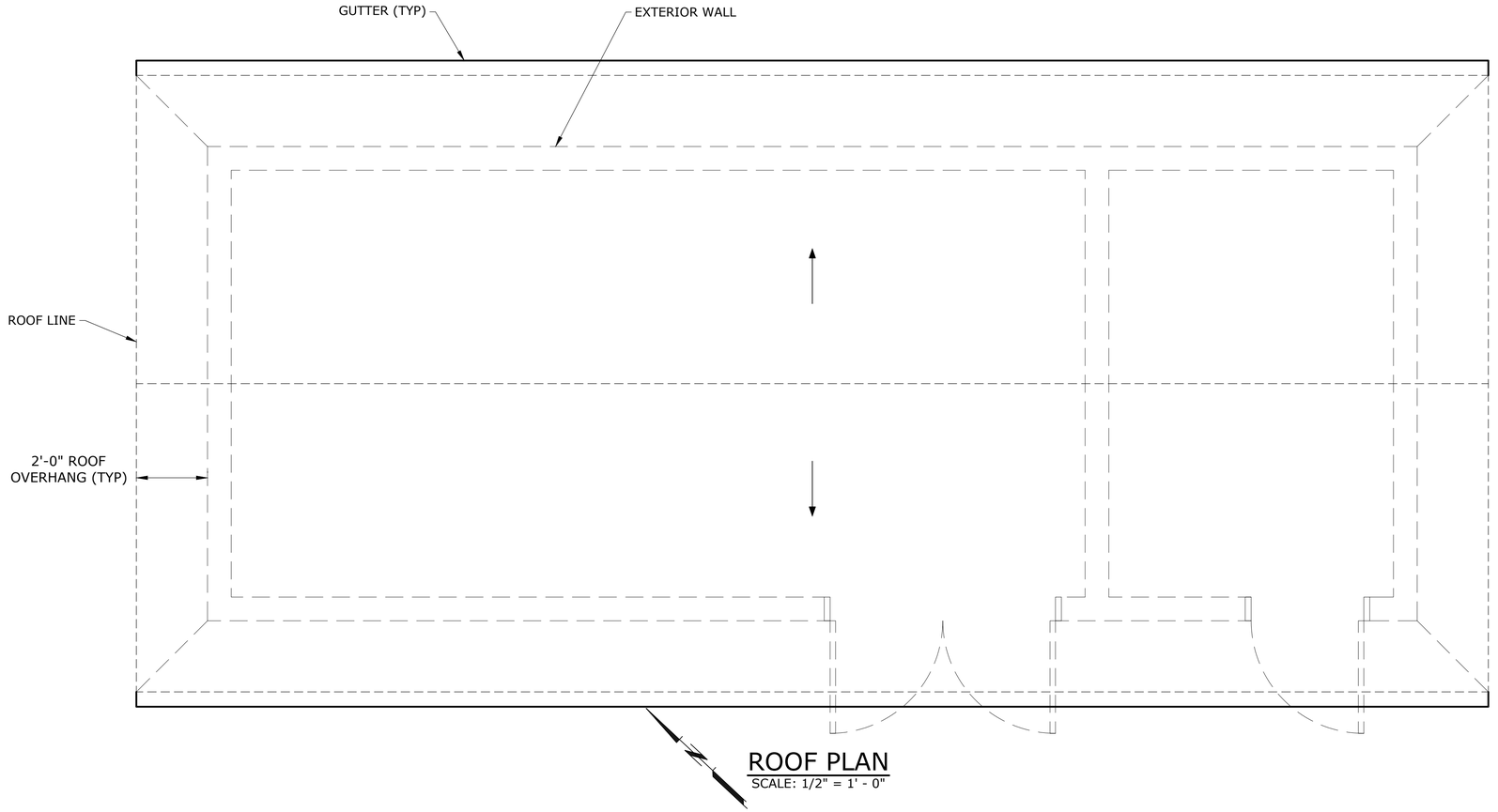
MATERIAL COLOR SCHEDULE		
ITEM/SURFACE	MATERIAL	COLOR
EXTERIOR WALLS - MAIN BLOCK	SPLIT FACE CMU	
ROOF		BROWN

DOOR SCHEDULE					
DOOR #	DESCRIPTION	ROUGH OPENING	NOMINAL SIZE	OPEN	SPECIFICATION
1	STEEL DOUBLE DOOR	6-8" x 7-4"	3'-2" x 7'-2" 3'-2" x 7'-2"	RH LHR	08 11 13
2	STEEL SINGLE DOOR	3'-4" x 7'-4"	3'-2" x 7'-2"	LHR	08 11 13

* PROVIDE OPENING ACCORDANCE TO SUPPLIER'S RECOMMENDATIONS, WHICH SUPERCEDE THIS ESTIMATE.



FLOOR PLAN
SCALE: 1/2" = 1' - 0"



ROOF PLAN
SCALE: 1/2" = 1' - 0"

60% SUBMITTAL

NO.	DATE	BY	REVISION

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CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

FLOOR PLAN, ROOF PLAN, & DETAILS

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

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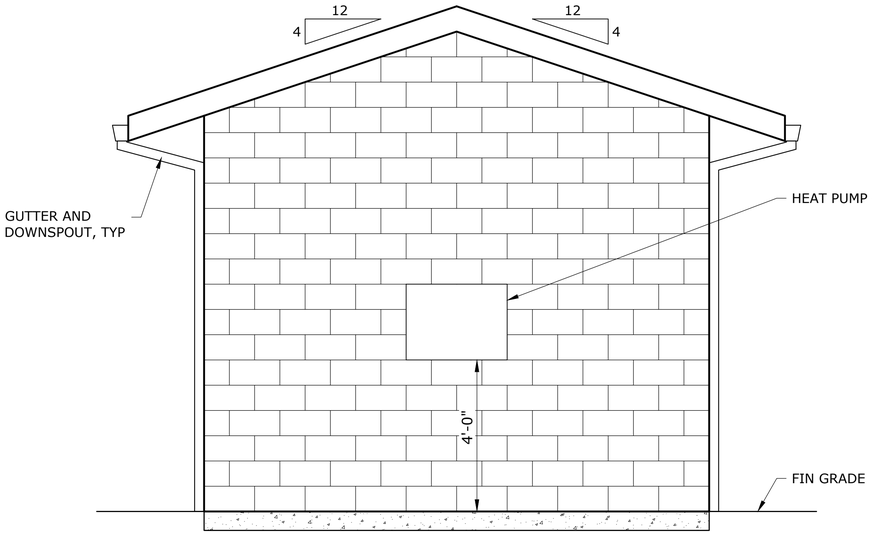
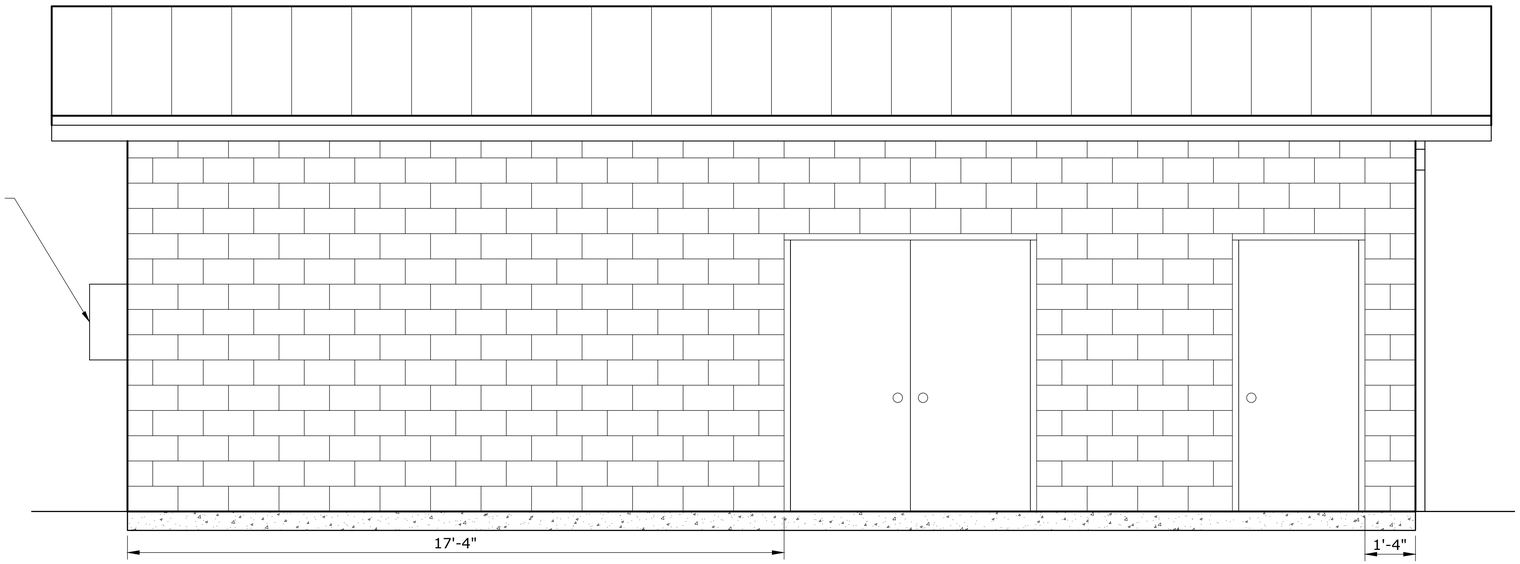
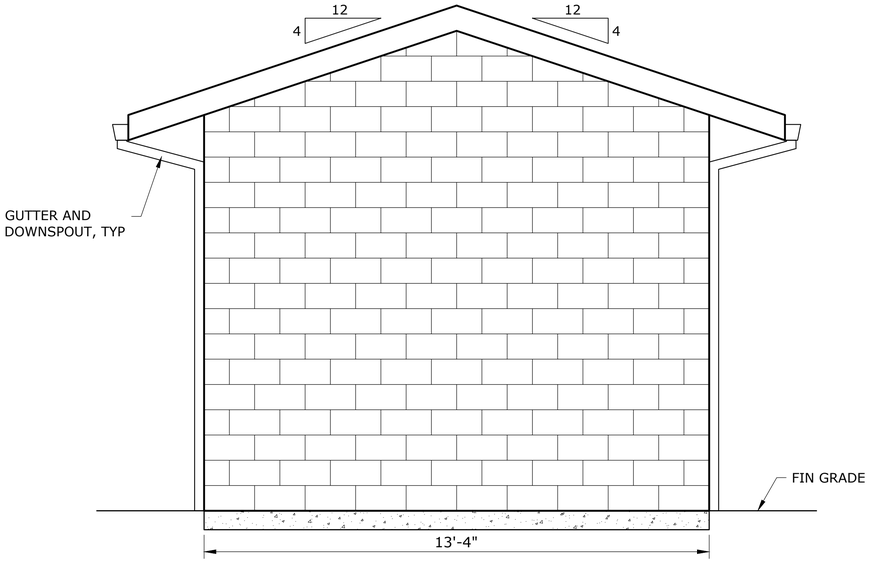


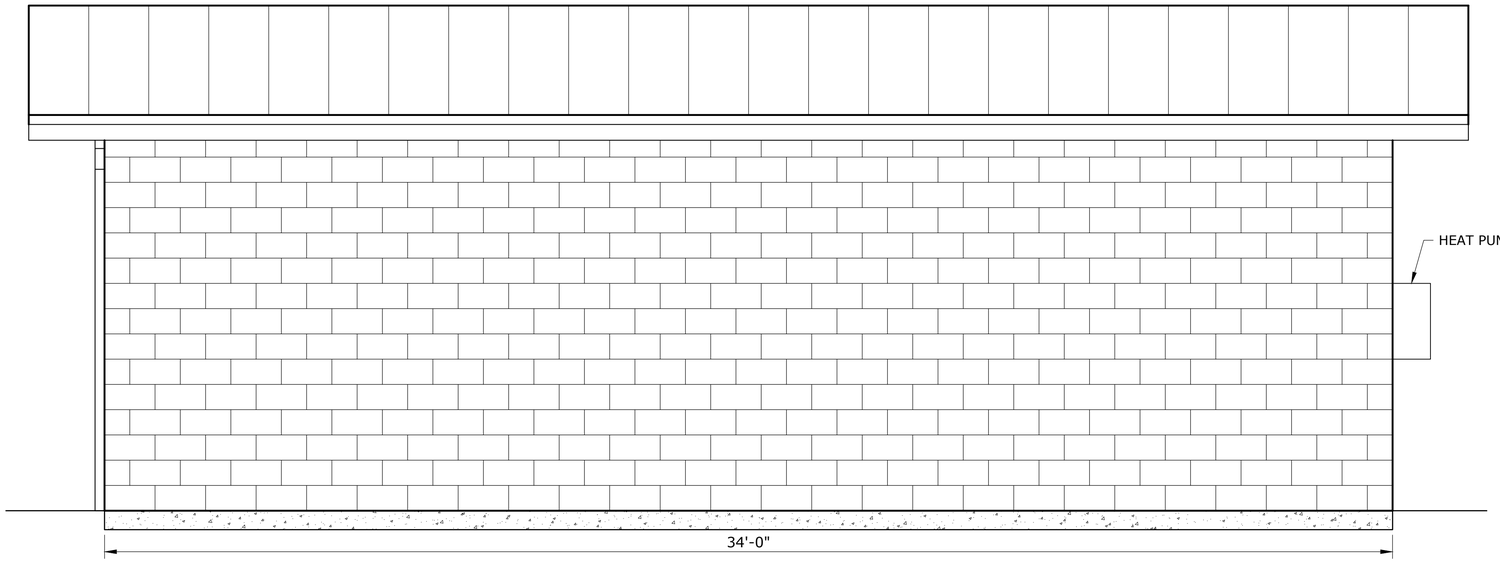
NORTH-WEST ELEVATION
SCALE: 1/2" = 1' - 0"



SOUTH-WEST ELEVATION
SCALE: 1/2" = 1' - 0"



SOUTH-EAST ELEVATION
SCALE: 1/2" = 1' - 0"



NORTH-EAST ELEVATION
SCALE: 1/2" = 1' - 0"

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CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

BUILDING ELEVATIONS

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
A-3
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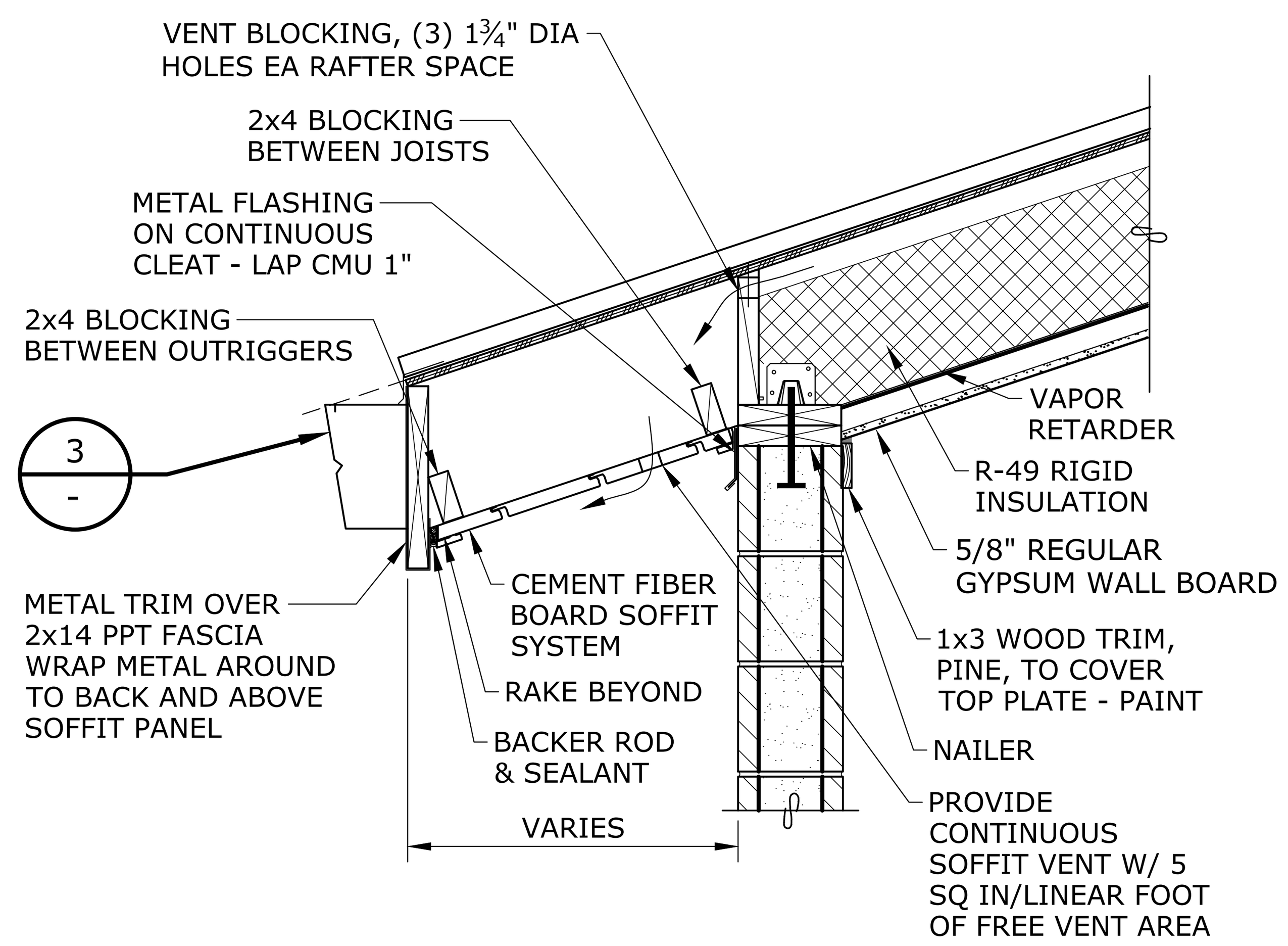
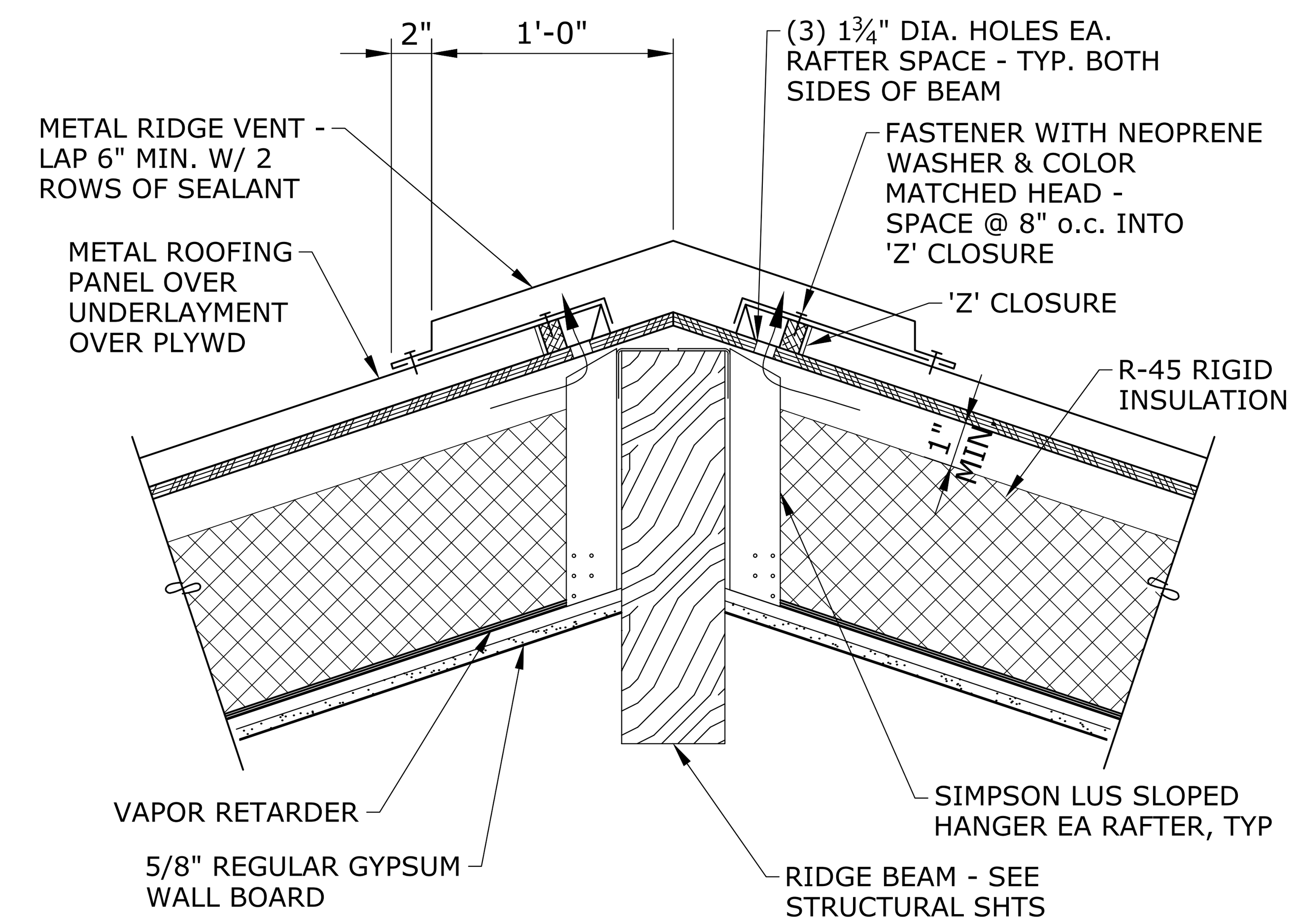
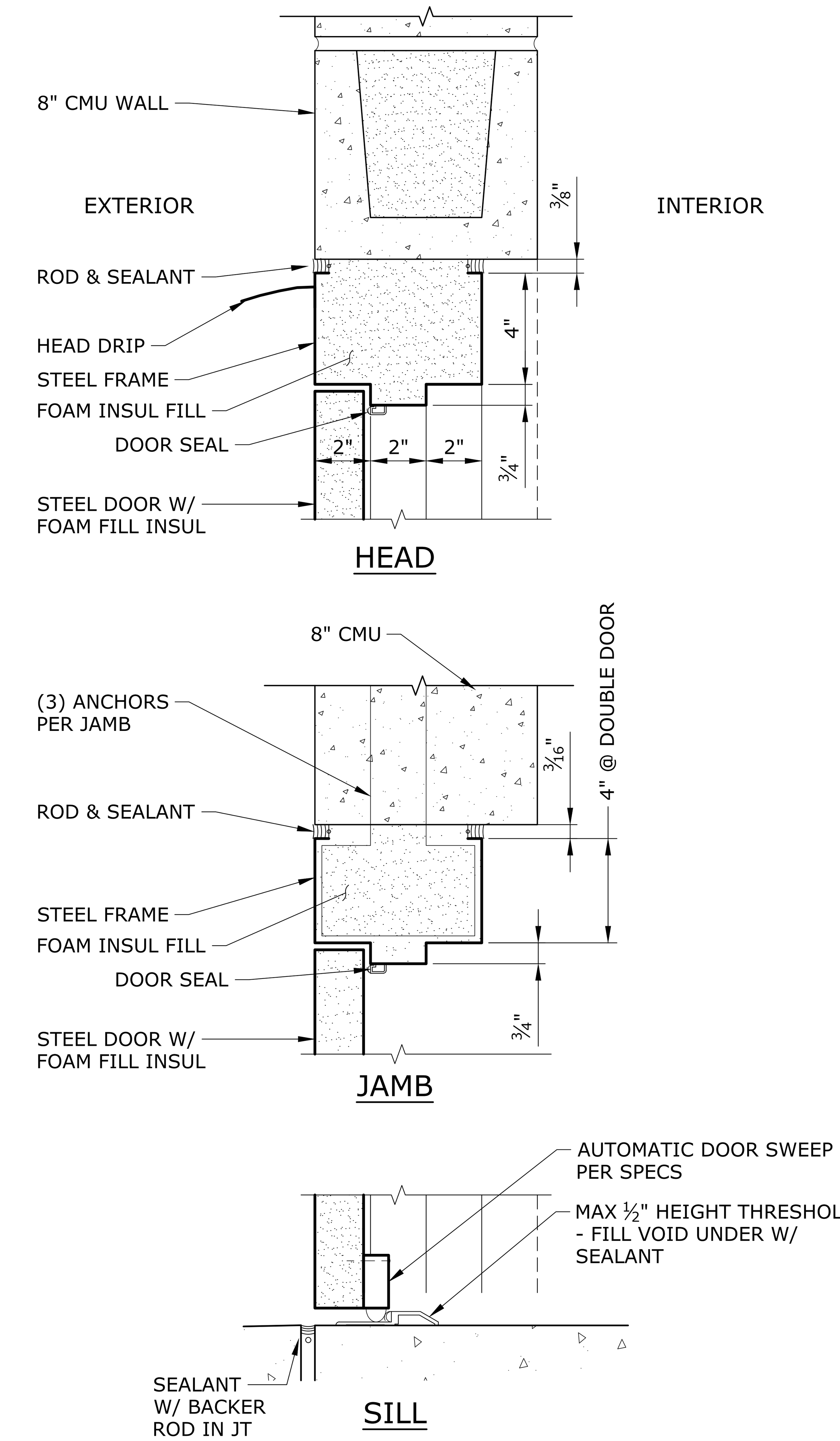
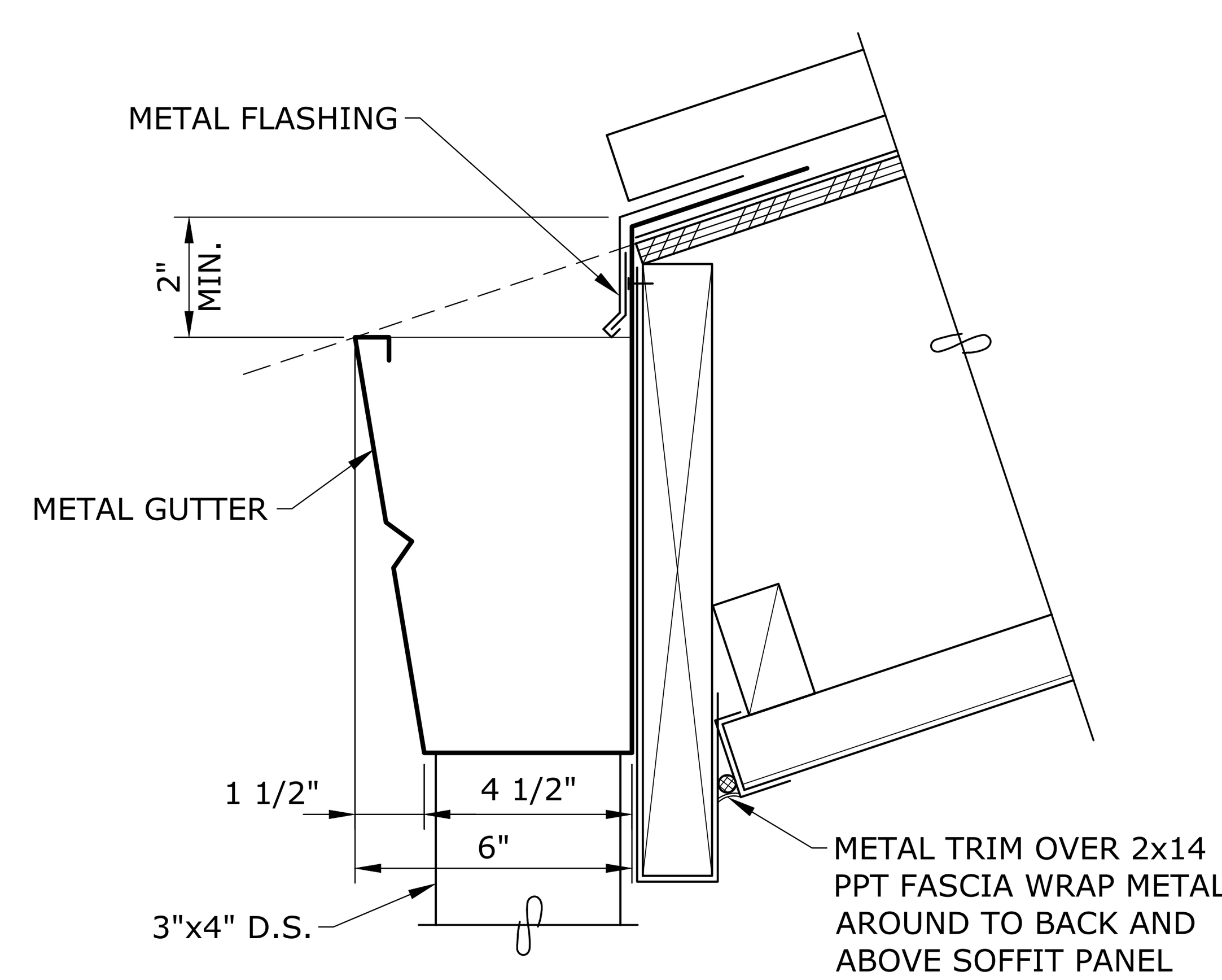


FASCIA
SCALE: 1" = 1'-0"
1
-

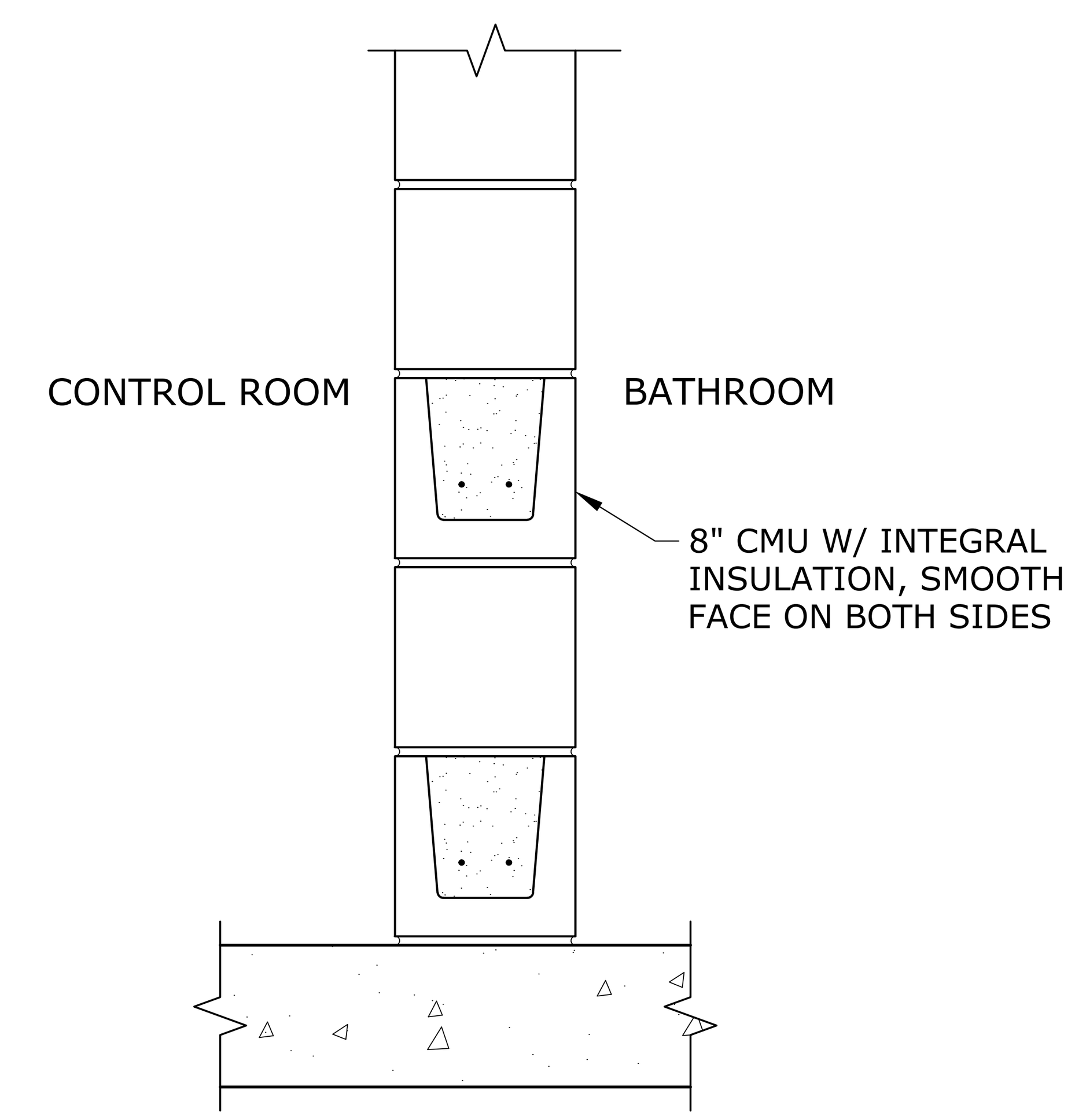


RIDGE - CONTROL ROOM
SCALE: 1 1/2"=1'-0"
2
-





TYPICAL 6" GUTTER
SCALE: 3"=1'-0"
3
-



INTERIOR CMU WALL
SCALE: NTS
4
-

EXTERIOR DOORS
SCALE: 3"=1'-0"
5
-

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LIFT STATION
NO. 3
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ARCHITECHTURAL DETAILS

PROJECT NO.: 21-3171 SCALE: AS SHOWN DATE: FEBRUARY 2022

SHEET
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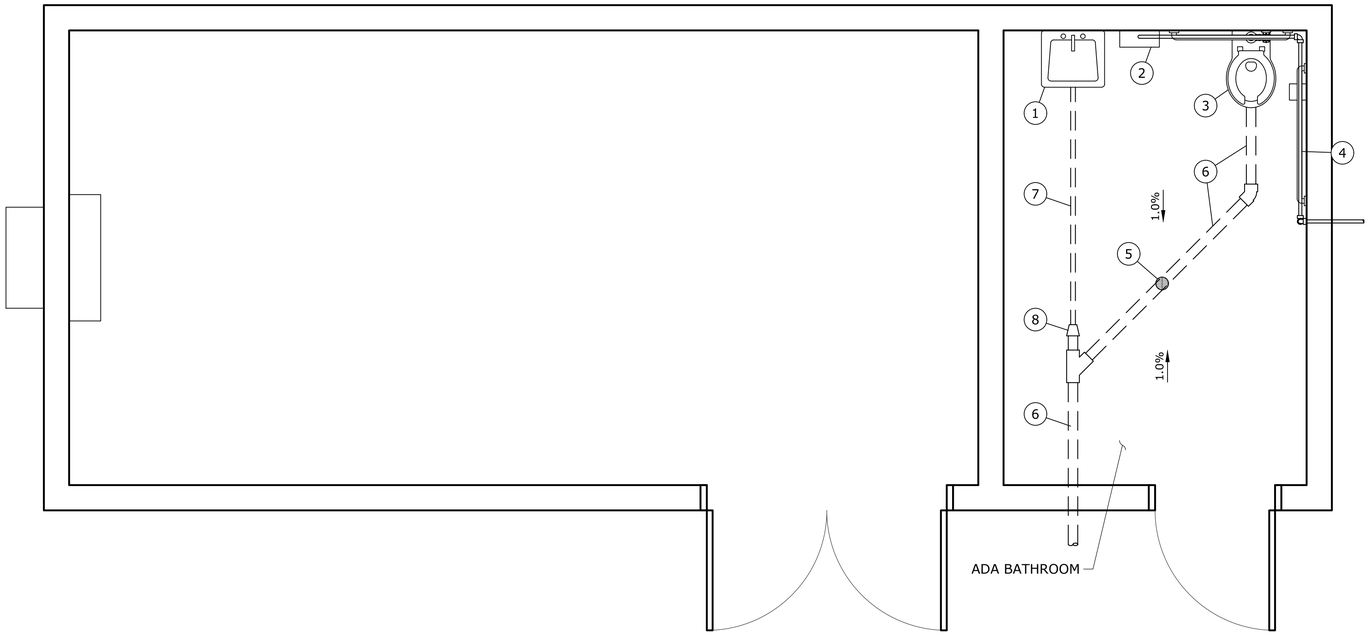


FLOOR PLAN
SCALE: 1/2" = 1' - 0"

KEY NOTES

1. STAINLESS STEEL ADA COMPLIANT WALL MOUNTED SING AND SINGLE PUSH BUTTON METERING FAUCET AND VANDAL RESTRAINT ENCLOSURE
2. TANKLESS ELECTRIC WATER HEATER, ARISTON GL 25 TI OR APPROVED EQUAL
3. STAINLESS STEEL ADA COMPLIANT WALL MOUNTED TOILET W/ CONCEALED FLUSH VALVE
4. INSTALL 1" COPPER WATER CARRIER PIPE 7' ABOVE FLOOR, SEE DET 1, THIS SHT
5. 4" DIA FLOOR DRAIN W/ P-TRAP
6. 3" DRAIN PIPE AND FITTINGS AS REQ'D
7. 1½" DRAIN PIPE
8. 1-½" x 3" RDCR

PLUMBING NOTES:

1. ALL FLOOR DRAINS, CLEANOUTS AND PLUMBING FIXTURES SHALL BE TRAPPED AND VENTED AS REQUIRED BY UNIFORM PLUMBING CODE AND LOCAL PLUMBING CODE.

2. SLOPE CONCRETE SLAB FLOORS TO FLOOR DRAINS AT 1% MINIMUM SLOPE, SEE S SHEETS.

3. SLOPE ALL DRAIN PIPING AT 2% MINIMUM.

4. ALL FLOOR DRAIN PIPING SHALL BE CAST IRON SOIL PIPE.

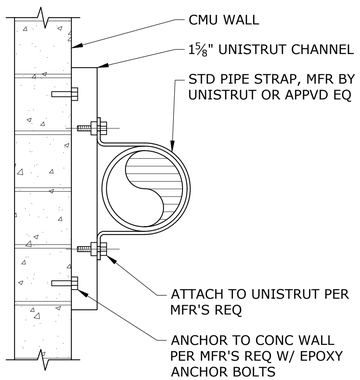
5. FOUNDATION DRAIN AND ROOF DRAINAGE NOT SHOWN. SEE CIVIL SHEETS.

6. MOUNT REDUCED PRESSURE BACKFLOW PREVENTER ASSEMBLY AND BALL VALVE TO WALL MINIMUM 36" HIGH USING UNISTRUT CHANNEL AND SUPPORTS. INSULATE DISSIMILAR METALS. SERVICE TO ALL BUILDING FACILITIES SHALL BE DOWNSTREAM OF ALL THESE APPURTENANCES.

7. ALL POTABLE WATER PIPING SHALL BE COPPER PER SPECIFICATIONS. SOLDER JOINTS.

NOTES:

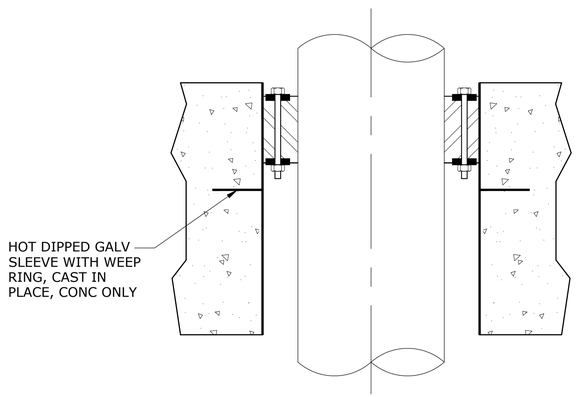
1. ALL PRESSURIZED PIPING SHALL BE MECHANICALLY RESTRAINED.



NOTES:

1. ORIENT UNISTRUT CHANNEL VERTICALLY OR HORIZONTALLY DEPENDING ON APPLICATION.
2. SUPPORT LOCATIONS PER SPECIFICATIONS.
3. ALL SUPPORT MATERIALS SHALL BE PER SPECIFICATION SECTION 22 05 29.

PIPE STRAP SUPPORT (1 / -)
SCALE: NTS



FLOOR PENETRATION DETAIL (2 / -)
SCALE: NTS

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CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

PLUMBING PLAN AND DETAILS

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET **M-1** 29 of 51

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CONTROL DRAWING SYMBOLS

- CONTACT – NORMALLY OPEN
- CONTACT – NORMALLY CLOSED
- CONTACT –NORMALLY OPEN TIMING CLOSED
- CONTACT –NORMALLY CLOSED TIMING OPEN
- CONTACT –NORMALLY OPEN TIMING OPEN
- CONTACT –NORMALLY CLOSED TIMING CLOSED
- FLOAT SWITCH – NORMALLY OPEN
- FLOAT SWITCH – NORMALLY CLOSED
- TEMPERATURE SWITCH – NORMALLY OPEN
- TEMPERATURE SWITCH – NORMALLY CLOSED
- LIMIT SWITCH – NORMALLY OPEN
- LIMIT SWITCH – NORMALLY CLOSED
- NOHC LIMIT SWITCH – NORMALLY OPEN HELD CLOSED
- NCHO LIMIT SWITCH – NORMALLY CLOSED HELD OPEN
- PUSHBUTTON – NORMALLY OPEN
- PUSHBUTTON – NORMALLY CLOSED
- XO OX 2 POSITION SELECTOR SWITCH
- H O A 00X X00 3 POSITION SELECTOR SWITCH (HOA)
- XXO OXX 00X X00 2 POLE 3 POSITION SELECTOR SWITCH
- CIRCUIT BREAKER – SINGLE POLE
- FUSE
- CR COIL – CONTROL RELAY
- B PILOT LIGHT – PUSH–TO–TEST BLUE
- R PILOT LIGHT – PUSH–TO–TEST RED

Industrial Systems INC
12119 NE 99th Street
Suite #2090
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Phone: (360) 718-7267
Fax: (360) 952-8958
e-mail: is@industrialsystems-inc.com
OR CCB #196597 WA #INDUSSI880K9
AK #1018436
PROJECT#:21.65.01

CONTROL DRAWING SYMBOLS

- HP MOTOR, 3 PHASE
- THERMAL OVERLOAD
- MAGNETIC STARTER
- VARIABLE FREQUENCY DRIVE (VFD)
- TRANSFORMER
- HEATER
- CONNECTION
- NO CONNECTION
- FIELD WIRE
- SHIELDED WIRE
- GROUND (CHASSIS)
- GROUND (EARTH)
- FLD FIELD TERMINAL (PUMP CONTROL PANEL BACKPLATE)
- TERMINAL
- CONNECTOR

INSTRUMENTATION SYMBOLS

- LE100 LE100 – LEVEL ELEMENT (TRANSDUCER)
- LIC100 LIC100 – LEVEL INDICATE CONTROLLER (WET WELL LEVEL)
- PIT100 PIT100 – PRESSURE INDICATE TRANSMITTER (FORCE MAIN PRESSURE)
- FE100 FE100 – FLOW ELEMENT (FLOW METER ELEMENT)
- FIT100 FIT100 – FLOW INDICATE TRANSMITTER (FLOW METER TRANSMITTER)

PLAN DRAWING SYMBOLS

- J JUNCTION BOX
- M MOTOR CONNECTION
- CONDUIT SEAL–OFF
- SPECIAL EQUIPMENT CONNECTION AS NOTED
- GFI SIMPLEX, DUPLEX, QUADPLEX RECEPTACLE, W/DESIGNATOR
  GFI = GROUND FAULT INTERRUPTING
  WP = WEATHERPROOF
- $ $3 WALL SWITCH STANDARD TOGGLE, W/DESIGNATOR
  3 = 3–WAY
  O = OCCUPANCY
  T = TIMER
- SURFACE MOUNTED LED LUMINAIRE *
- WALL MOUNTED LED LUMINAIRE *

* SHADED LUMINAIRE INDICATES BATTERY BACKED UNIT

WIRING NOTES

1. 480 VOLT SUPPLY WIRING SHALL BE BROWN/ORANGE/YELLOW TINNED MTW/TEW. PHASE ROTATION SHALL BE FORWARD A. B. C.
2. ALL NEUTRAL WIRING SHALL BE WHITE TINNED MTW/TEW. ALL WIRES CONNECTED TO BREAKERS IN THE BREAKER PANEL SHALL BE BLACK 12 AWG TINNED MTW/TEW.
3. ANY 120 VAC WIRE THAT IS NOT CONNECTED DIRECTLY TO A BREAKER IS A CONTROL WIRE, ALL CONTROL WIRES SHALL BE RED 14 AWG TINNED MTW/TEW.
4. ALL 12 VDC+ WIRES SHALL BE ORANGE 16 AWG TINNED MTW/TEW. ALL 12 VDC– WIRES SHALL BE YELLOW 16 AWG TINNED MTW/TEW.
5. ALL 24 VDC+ WIRES SHALL BE DARK BLUE 16 AWG TINNED MTW/TEW. ALL 24 VDC– SHALL BE WHITE WITH A BLUE STRIPE 16 AWG TINNED MTW/TEW.
6. ALL INTRINSICALLY SAFE WIRES SHALL BE PURPLE.
7. ALL ANALOG INPUTS SHALL BE 18 AWG SHIELDED TWISTED PAIR CONDUCTORS BETWEEN SOURCE, DEVICE AND THE INPUT CARD. CONNECT THE SHIELD DRAIN ON THE PUMP CONTROL PANEL END.
8. BRANCH CIRCUITS, CONTROL CIRCUITS AND PUMP MOTOR FIELD WIRING SHALL BE THE SAME SIZE AND COLOR AS THE CONTROL PANEL WIRING IT IS CONNECTED TO. ALL FIELD WIRING SHALL BE TFFN/THHN.
9. WIRE NUTS AND BUTT SPLICES SHALL NOT BE USED IN ANY CIRCUIT OTHER THAN LIGHTING CIRCUITS.

WIRE MARKINGS

1. ALL WIRES SHALL BE LABELED WITH THE SAME DESCRIPTION ON BOTH ENDS.
2. WIRES LABEL SHALL HAVE THE SAME DESCRIPTION AS THE CITY OF LACEY'S ORIGINAL DRAWING.
3. WIRE LABELS SHALL BE PRINTED HEAT SHRINK TYPE WIRE MARKING SLEEVES.
4. WIRE LABEL TEXT SHALL BE ORIENTED IN THE SAME DIRECTION. HORIZONTAL WIRE TO READ FROM LEFT TO RIGHT AND VERTICAL WIRES TO READ FROM TOP TO BOTTOM.
5. COLOR CODE ALL SECONDARY SERVICE FEEDER AND BRANCH CIRCUIT CONDUCTORS.

TERMINAL BLOCK MARKINGS

1. TERMINAL BLOCK MARKING AND WIRE LABELING SHALL HAVE THE SAME DESCRIPTION.
2. TERMINALS BLOCKS LABELING SHALL BE MACHINE PRINTED.
3. TERMINAL BLOCK TEXT SHALL BE ORIENTED IN THE SAME DIRECTION AS THE WIRE. BLOCKS TO READ FROM LEFT TO RIGHT AND FROM TOP TO BOTTOM.

CONDUIT MARKINGS

1. CONDUITS WITH INTRINSICALLY SAFE CONDUCTORS SHALL BE LABELED.

CONTROL SYSTEMS MANUFACTURE'S NOTE

1. SUBMITTAL DRAWINGS SHALL BE SUBMITTED IN AN UNPROTECTED AUTOCAD FORMAT.
2. SUBMITTAL DRAWINGS SHALL CONTAIN EVERY DETAIL CONTAINED IN THE CITY OF LACEY'S ORIGINAL DRAWING. EVERY COMPONENT AND SYMBOL SHALL BE REPRESENTED.
3. SUBMITTAL DRAWINGS SHALL HAVE A LAYOUT KEY WITH EVERY COMPONENT OF THE CITY OF LACEY'S ORIGINAL DRAWING IDENTIFIED.
4. SUBMITTAL DRAWINGS SHALL USE THE SAME COMPONENT NAMES AS THE LAYOUT KEY IN CITY OF LACEY'S ORIGINAL DRAWING.
5. CONTROL SYSTEMS MANUFACTURE SHALL COMPLETE THE APPROVED MATERIAL CHECK LIST.

DRAWING LIST

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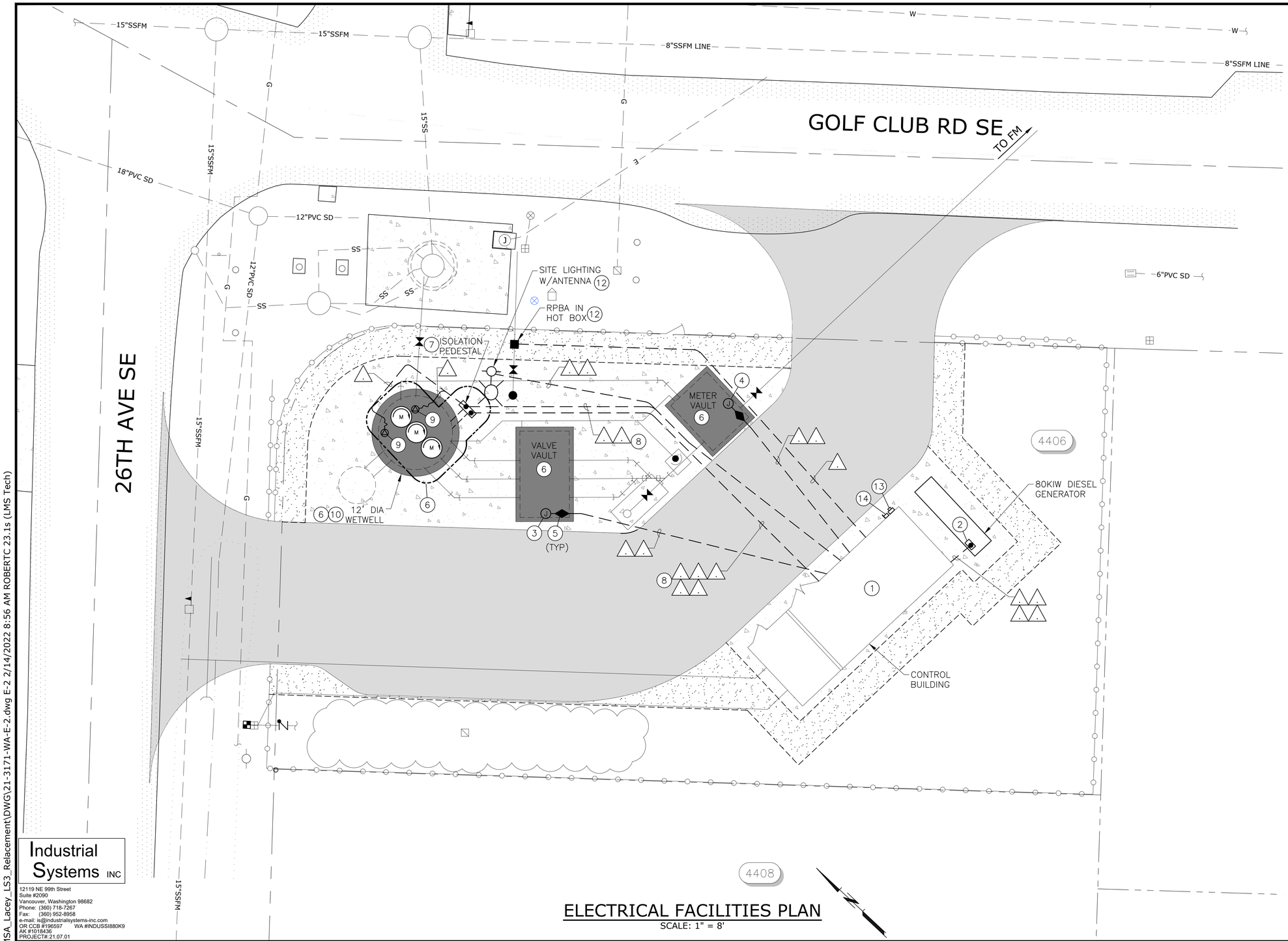
CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

WIRING SYMBOLS AND REQUIREMENTS

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
E-1
X OF X



KEY NOTES

1. ELECTRICAL BUILDING PLANS, SEE SHEET E-3.
2. COORDINATE STUB-UP LOCATION WITH GENERATOR MFR.
3. PROVIDE AND INSTALL NEMA 4X JUNCTION BOX FOR CONNECTION OF (3) CHECK VALVE LIMIT SWITCH SWITCHES. SEE SHEET E-11. ROUTE PGRC ALONG WALLS AND PIPING WITH FLEX CONDUIT TO FINAL CONNECTION.
4. PROVIDE AND INSTALL NEMA 4X JUNCTION BOX FOR CONNECTION OF FORCE MAIN PRESSURE TRANSMITTER AND FLOWMETER. SEE SHEET E-11. FLOWMETER MFR CONDUCTORS TO BE ROUTED TO TRANSMITTER IN BUILDING AND ARE **NOT TO BE SPLICED**. ROUTE PGRC ALONG WALLS AND PIPING W/ FLEX CONDUIT TO FINAL CONNECTION.
5. CONDUITS ARE ENTERING A CLASS 1 DIV 2 AREA AND ARE REQUIRED TO BE SEALED TO PREVENT GAS PASSAGE. PROVIDE SEALANT AS REQUIRED.
6. CLASS 1 DIV. 2 GROUP D SPACE IN AN ENVELOPE 18" ABOVE GRADE 3' LATERALLY FROM HATCH AND TRENCH OPENINGS FOR WETWELL AND CLASS 1 DIV. 2 GROUP D SPACE INSIDE VAULTS. INTERIOR OF WETWELL IS CLASS 1 DIV. 1 GROUP D SPACE.
7. ISOLATION PEDESTAL WITH PUMP DISCONNECT PLUG AND RECEPTACLES. SEE SHEET E-8.
8. CONDUITS ARE PASSING THROUGH A CLASS 1 DIV 2 AREA AND ARE REQUIRED TO BE CONTINUOUS FROM BELOW GRADE TO ISOLATION PEDESTAL.
9. HIGH LEVEL (HIGH BALL) FLOAT AND LEVEL TRANSDUCER. SEE SHEETS E-11 AND E-12.
10. SUBMERSIBLE PUMPS IN WETWELL. ROUTE PUMP MFR CABLING TO ISOLATION PEDESTAL IN PUMP CABLE TRAY INSET IN CONCRETE. SEE SHEET E-8 AND CIVIL SHEETS FOR ADDITIONAL INFORMATION.
11. SITE LIGHTING WITH RADIO ANTENNA, SEE SHEET E-11.
12. SEE SHEET E-11 FOR INSTALLATION DETAIL.
13. METERBASE AND METER PER PUGET SOUND ENERGY (PSE) STANDARDS. SEE SHEET E-3.
14. PSE METERING/SERVICE ENTRANCE DISCONNECT. SEE SHEET E-3.

△ CONDUIT IDENTIFIER.
SEE CONDUIT SCHEDULE SHEET E-10.

ELECTRICAL FACILITIES PLAN
SCALE: 1" = 8'

60% SUBMITTAL

Industrial Systems INC
12119 NE 99th Street
Suite #2090
Vancouver, Washington 98682
Phone: (360) 718-7267
Fax: (360) 952-8958
e-mail: is@industrialsystems-inc.com
OR CCB #196597 WA #INDUSSI880K9
AK #1018436
PROJECT#: 21.07.01

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ELECTRICAL SITE PLAN

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
E-2
X OF X

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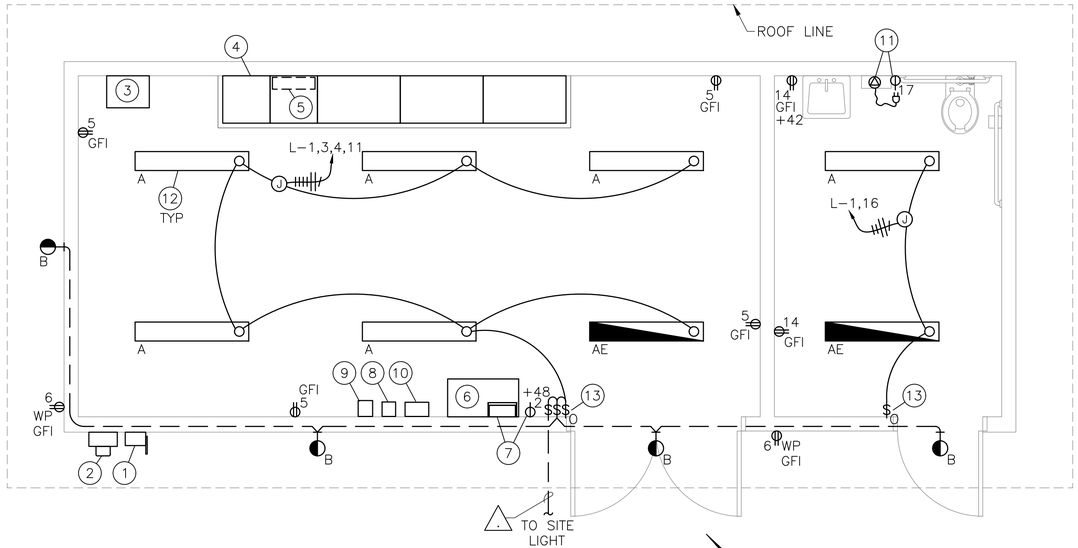
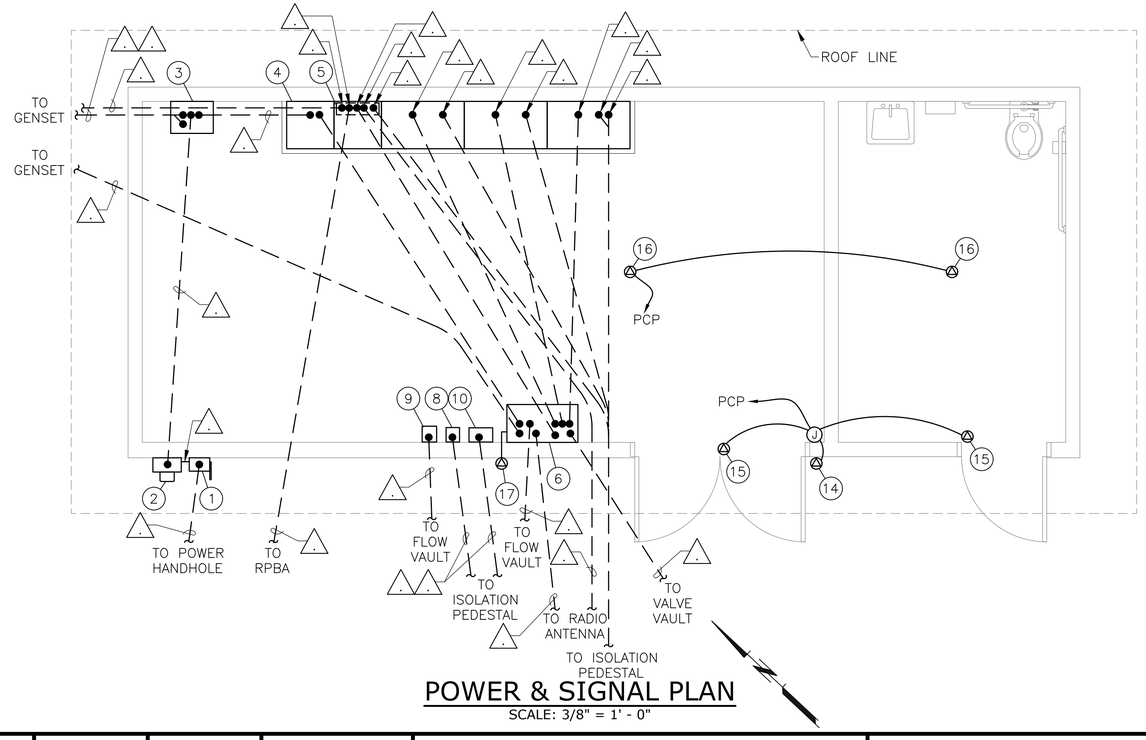
GENERAL NOTES

1. SEE SHEETS E-14, E-15 FOR APPROVED EQUIPMENT LISTING (#)
2. SEE LABEL SCHEDULE SHEET E-16. <XX>
3. ALL CONDUITS TO BE ROUTED UNDERGROUND, IN-SLAB, OR CONCEALED WHEREVER POSSIBLE OR PRACTICAL. ALL CONDUITS SHALL BE PVC COATED GALVANIZED RIGID, EXCEPT CONDUIT SOLEY INTERIOR TO THE BUILDING, IE, LIGHTING CONDUITS, WHICH CAN BE GALVANIZED RIGID.
4. ALL RECEPTACLES TO BE LOCATED 18" AFF, UNLESS OTHERWISE NOTED.
5. ROUTE UN-SWITCHED POWER CIRCUIT TO ALL BATTERY BACKED LUMINAIRES.
6. LUMINAIRES TO BE SURFACE MOUNTED AT FINAL FINISHED CEILING ELEVATION. ROUTE CONDUITS ABOVE FINISHED CEILING FOR CLEAN APPEARANCE.
7. ALL INTERIOR LIGHTING IS DIMMABLE.
8. INTERIOR LIGHTING HAS LOCAL CONTROLS TO PROVIDE MANUAL "ON-OFF" AND FULL RANGE DIMMING TRIGGERED BY OCCUPANCY SENSOR WITH AUTOMATIC TURN OFF SET AT 30 MINUTES OF OCCUPANTS LEAVING THE SPACE.
9. PROVIDE LABELING AT SWITCHES INDICATING EQUIPMENT CONTROLLED BY SWITCH, IE. "INTERIOR, AREA LIGHT, AND EXTERIOR LIGHTING". SWITCHES TO BE RECESSED IN WALL.

△ CONDUIT IDENTIFIER.
SEE CONDUIT SCHEDULE SHEET E-10.



ELECTRICAL FACILITIES PLAN
SCALE: 3/8" = 1' - 0"



POWER & SIGNAL PLAN
SCALE: 3/8" = 1' - 0"

KEY NOTES

1. MAIN SERVICE DISCONNECT, (16) INSTALL LABELS <1> <2>
2. UTILITY METER, (15), INSTALL LABEL <3>
3. AUTOMATIC TRANSFER SWITCH, (14)
4. MOTOR CONTROL CENTER (MCC). SEE SHEET E-9. INSTALL LABEL <5>
5. PANEL 'L' INTERIOR TO MCC.
6. PUMP CONTROL PANEL (PCP), SEE SHEET E-7.
7. UPS AND UPS SHELF, MOUNTED ABOVE PCP AND STRAPPED TO WALL FOR SEISMIC RESTRAINT. PROVIDE DEDICATED RECEPTACLE FOR UPS. (20) (35)
8. LEVEL TRANSMITTER, (19)
9. FLOWMETER TRANSMITTER, (23)
10. INSTRINSICALLY SAFE RELAY ENCLOSURE, SEE SHEET E-13.
11. TANKLESS WATER HEATER, PROVIDE DEDICATED RECEPTACLE FOR WATER HEATER.
12. PROVIDE AND INSTALL POWER AND DIMMING CONTROL CIRCUITING TO LUMINAIRES. HOMERUN SHOWN TO PANEL CIRCUIT ID.
13. ON/OFF/DIMMING WALL SWITCH WITH SMALL MOTION DUAL TECHNOLOGY (PDT) DETECTION. SENSOR-SWITCH WSXA PDT D WH.
14. INTRUSION BYPASS SWITCH (4)
15. INTRUSION DOOR SWITCH (5)
16. SMOKE DETECTOR (85)
17. CELLULAR ANTENNA, SEE SHEET E-13.

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ELECTRICAL BUILDING PLANS

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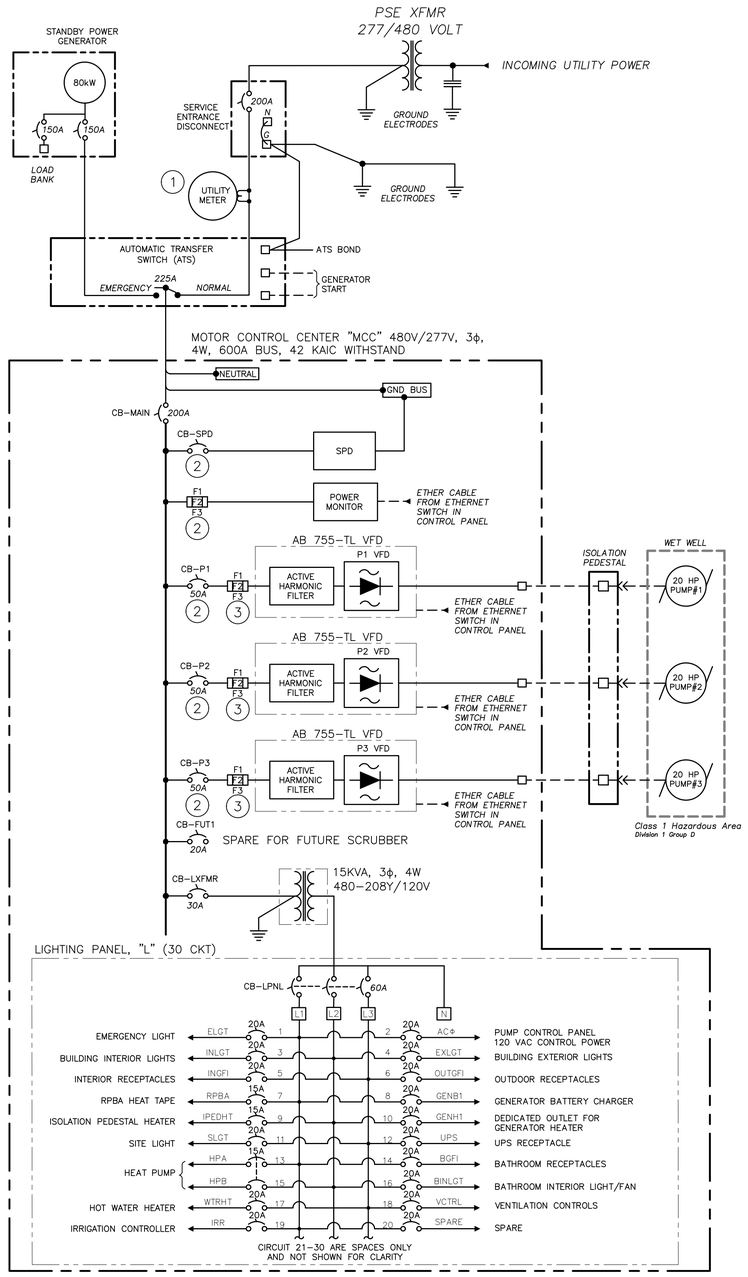
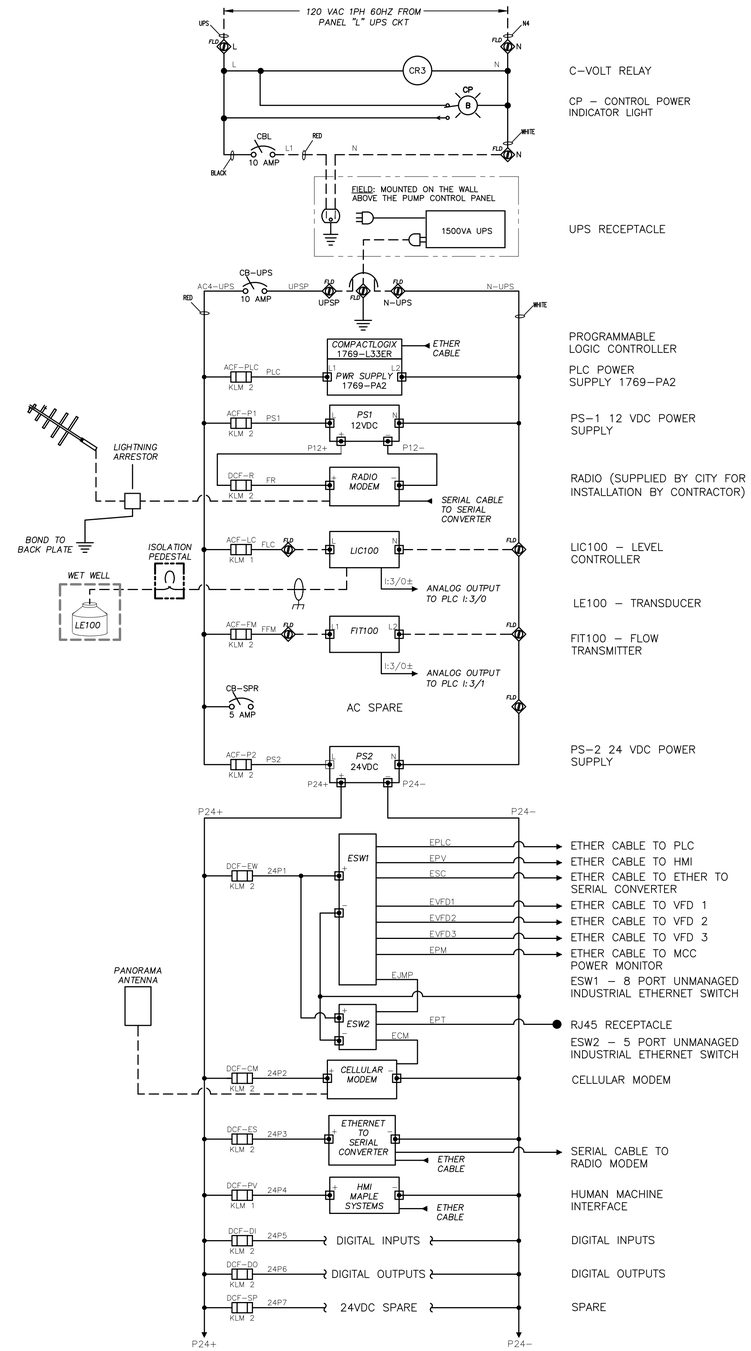
SHEET
E-3
X OF X



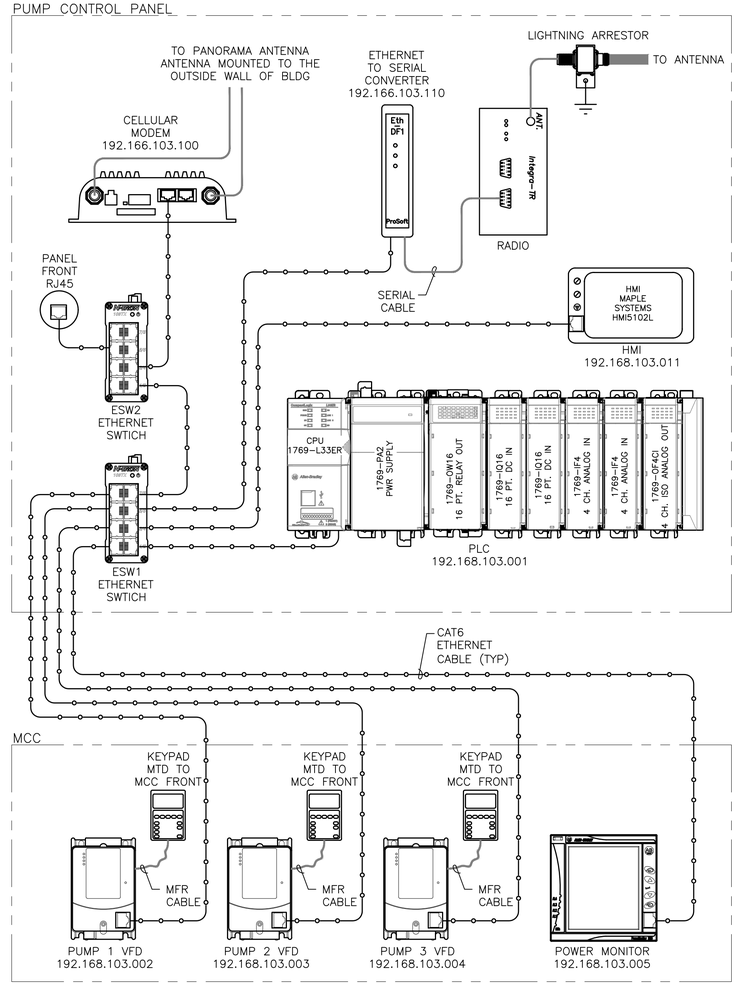
ONE-LINE DIAGRAM



PUMP CONTROL PANEL POWER DIAGRAM

KEY NOTES

1. MAIN REVENUE METERING. METER BY PUGET SOUND ENERGY (PSE); ENCLOSURE BASE PROVIDED BY CONTRACTOR PER PSE REQUIREMENTS.
2. OVERCURRENT DEVICE AND SIZE FOR EQUIPMENT TO BE PROVIDED PER MFR. RECOMMENDATIONS.
3. FAST ACTING FUSES FOR SCR PROTECTION IF RECOMMENDED BY MFR.



COMMUNICATIONS BLOCK DIAGRAM

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ONE-LINE AND PUMP CONTROL PANEL POWER DIAGRAMS

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET E-4
X OF X

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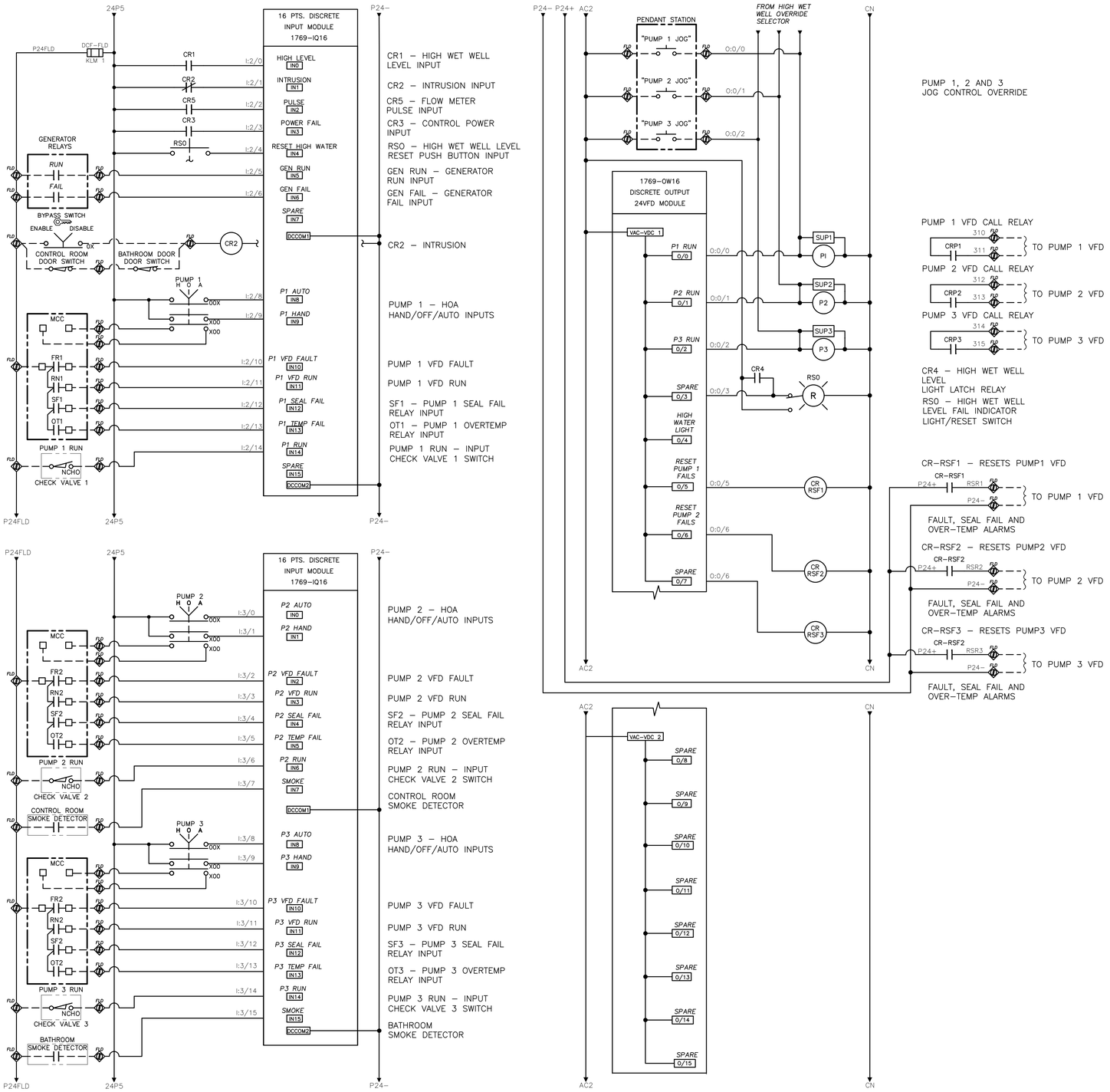

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PUMP CONTROL PANEL INPUT AND OUTPUT WIRING DIAGRAMS

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SHEET E-5 X OF X

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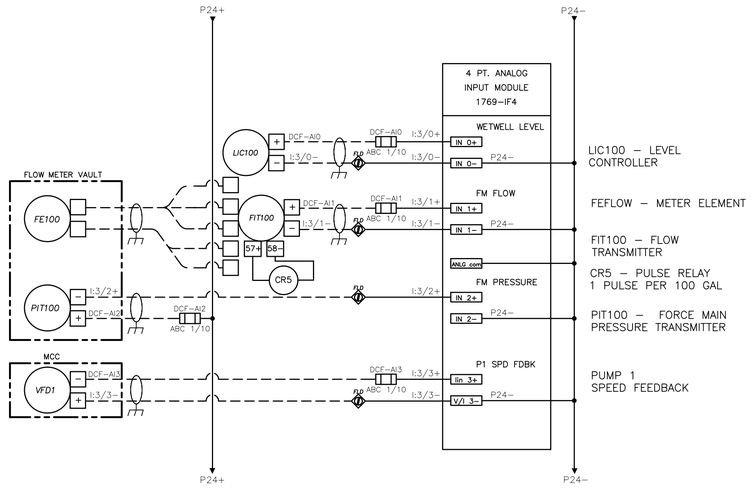

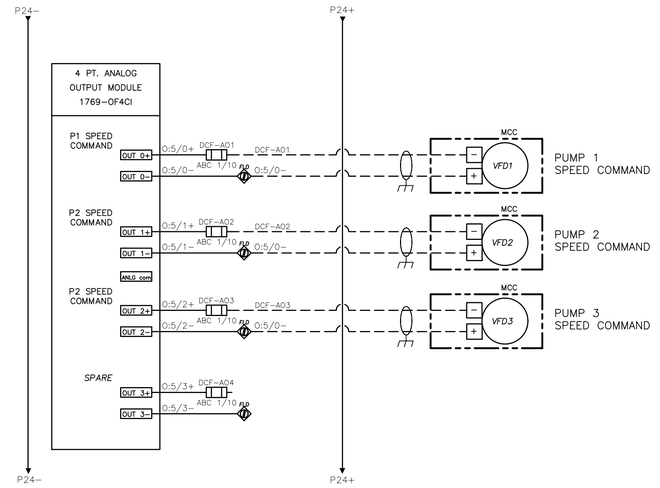

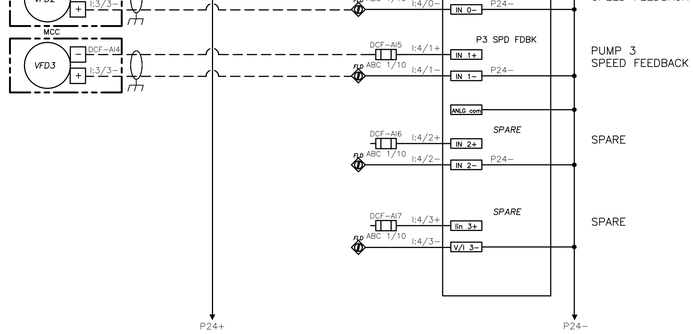

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PUMP CONTROL PANEL ANALOG WIRING DIAGRAMS

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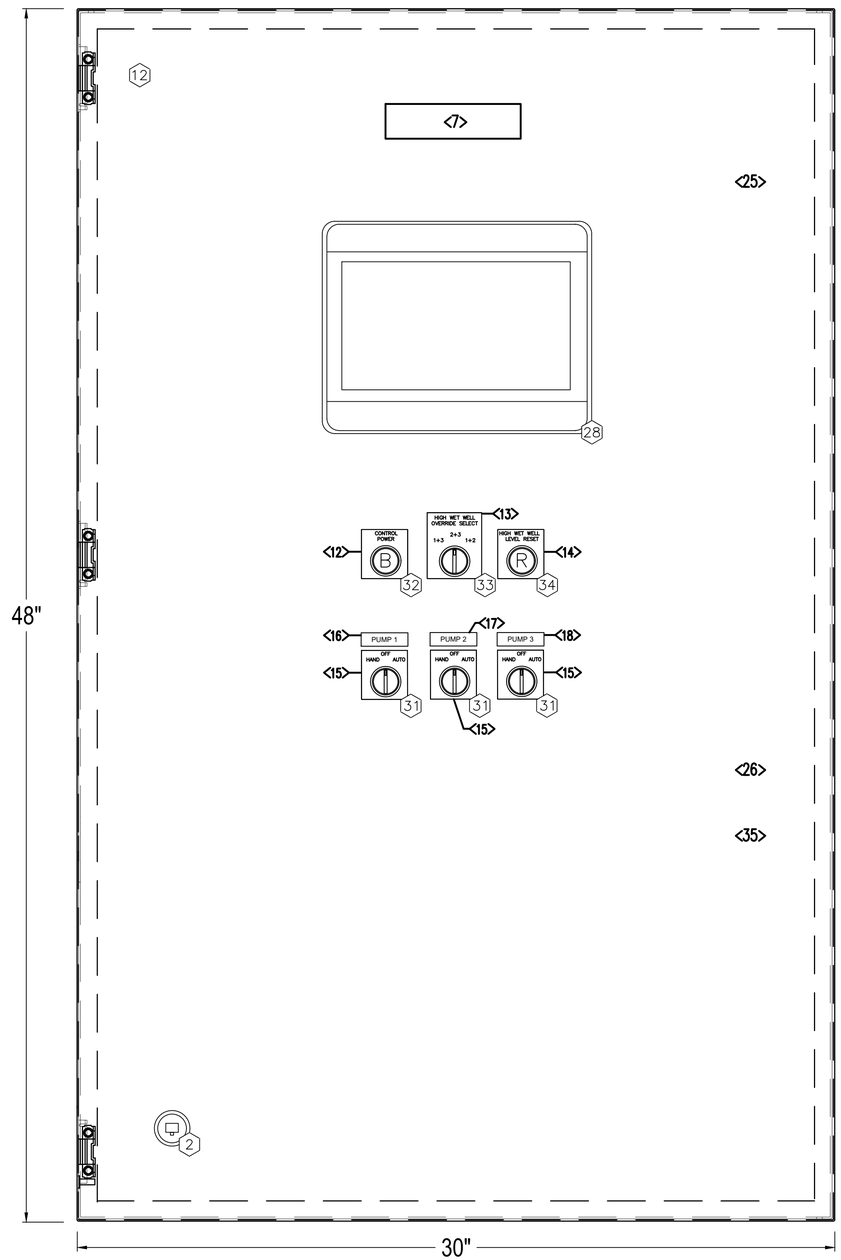
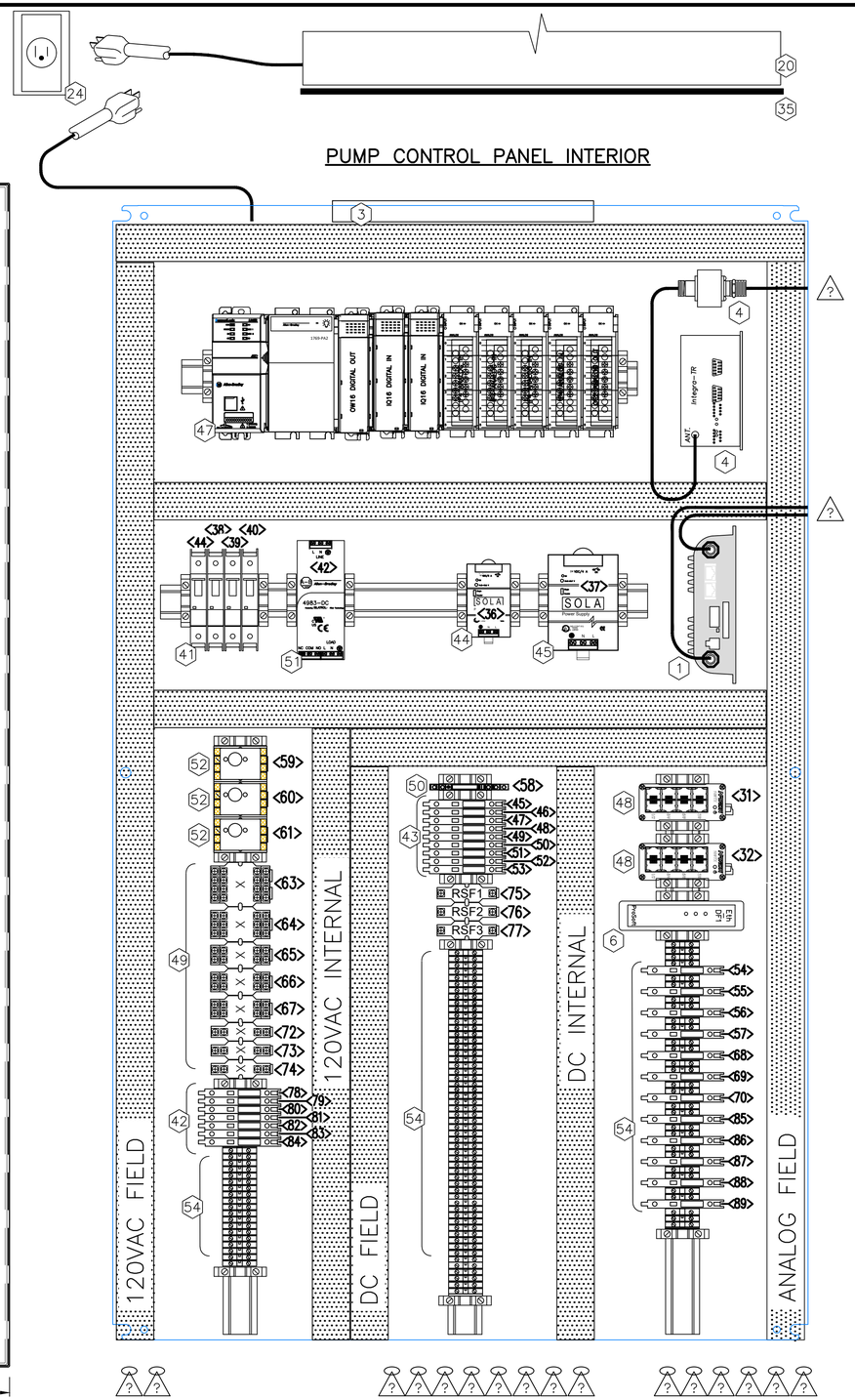
SHEET
E-6
X OF X

PUMP CONTROL PANEL EXTERIOR



PUMP CONTROL PANEL INTERIOR



SHEET LAYOUT KEY:

1. CELLULAR EQUIPMENT
2. ETHERNET PORT
3. CABINET LIGHT
4. RADIO EQUIPMENT
6. ETHERNET TO SERIAL CONVERTER
12. PUMP CONTROL PANEL
20. UPS
24. UPS RECEPTACLE
28. HMI
31. HOA SWITCH
32. CONTROL POWER INDICATOR
33. HIGH WET WELL OVERRIDE SELECTOR SWITCH
34. HIGH WET WELL LEVEL INDICATOR/RESET SWITCH
35. UPS SHELF
41. AC CIRCUIT BREAKER
42. AC FUSE HOLDERS
43. DC FUSE HOLDERS
44. 12 VDC POWER SUPPLY
45. 24 VDC POWER SUPPLY
47. PROGRAMMABLE LOGIC CONTROLLER AND I/O
48. ETHERNET SWITCH
49. CONTROL RELAYS
50. PULSE RELAY CR5
51. LINE POWER CONDITIONER
52. TIME DELAY RELAY
54. TERMINAL BLOCKS

△ CONDUIT PENETRATIONS. SEE CONDUIT SCHEDULE SHEET

<XX> SEE LABEL SCHEDULE SHEET

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PUMP CONTROL PANEL CONSTRUCTION DETAILS

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SHEET
E-7
X OF X

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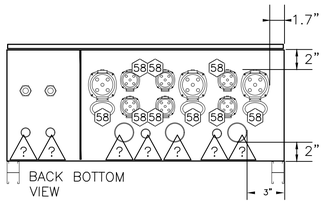
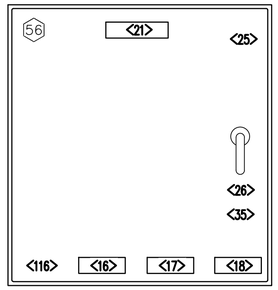
ENCLOSURE BOTTOM VIEW 'B'



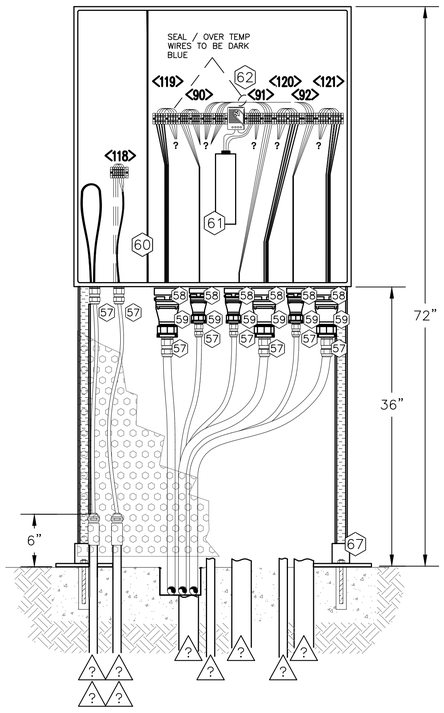
ISOLATION PEDESTAL ENCLOSURE EXTERIOR



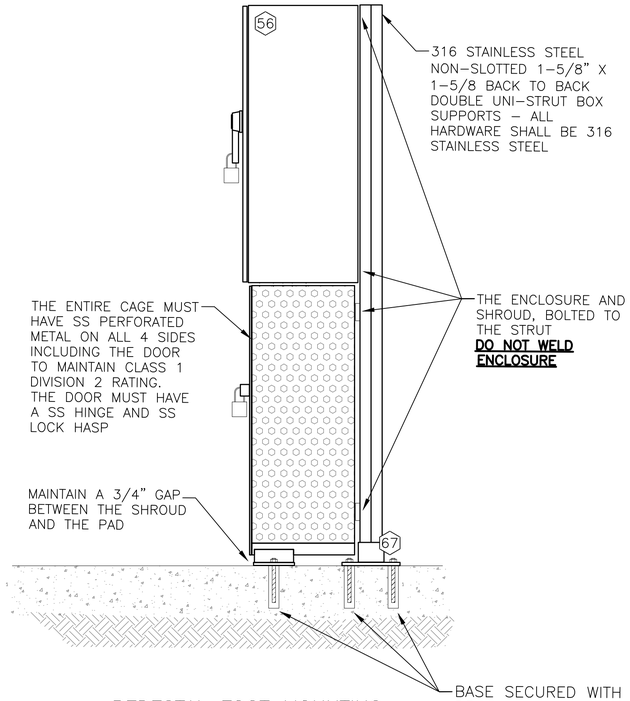
SPACE RESERVED FOR PUMP CABLE TRAY DETAIL

SHEET LAYOUT KEY:

- 56 ISOLATION PEDESTAL ENCLOSURE
- 57 CABLE SEAL
- 58 PUMP POWER RECEPTACLE
- 59 PUMP CORD CONNECTOR
- 60 ISOLATION PEDESTAL BARRIER
- 61 ISOLATION PEDESTAL HEATER
- 62 ISOLATION PEDESTAL HYGROSTAT
- 67 ISOLATION PEDESTAL POST BASE
- △ CONDUIT PENETRATIONS. SEE CONDUIT SCHEDULE SHEET
- <XX> SEE LABEL SCHEDULE SHEET

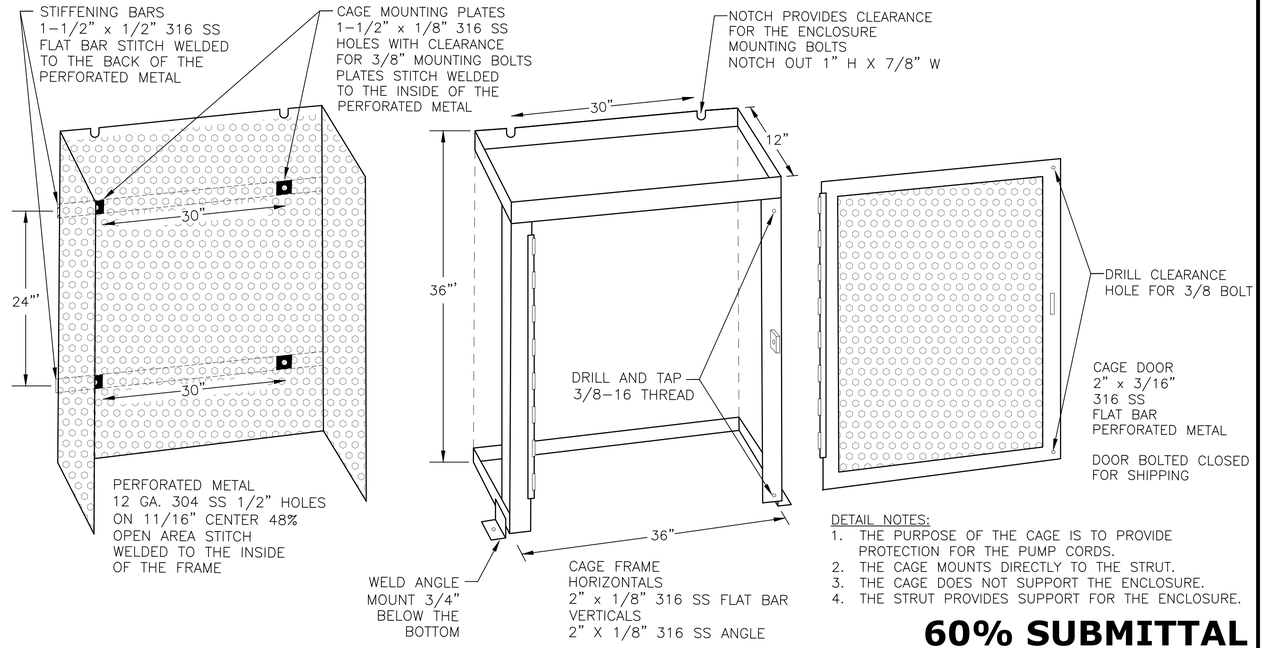


WETWELL ISOLATION PEDESTAL
ELEVATION VIEW 'A'



PEDESTAL FOOT MOUNTING
SIDE VIEW "C"

ISOLATION PEDESTAL CAGE



DETAIL NOTES:

1. THE PURPOSE OF THE CAGE IS TO PROVIDE PROTECTION FOR THE PUMP CORDS.
2. THE CAGE MOUNTS DIRECTLY TO THE STRUT.
3. THE CAGE DOES NOT SUPPORT THE ENCLOSURE.
4. THE STRUT PROVIDES SUPPORT FOR THE ENCLOSURE.

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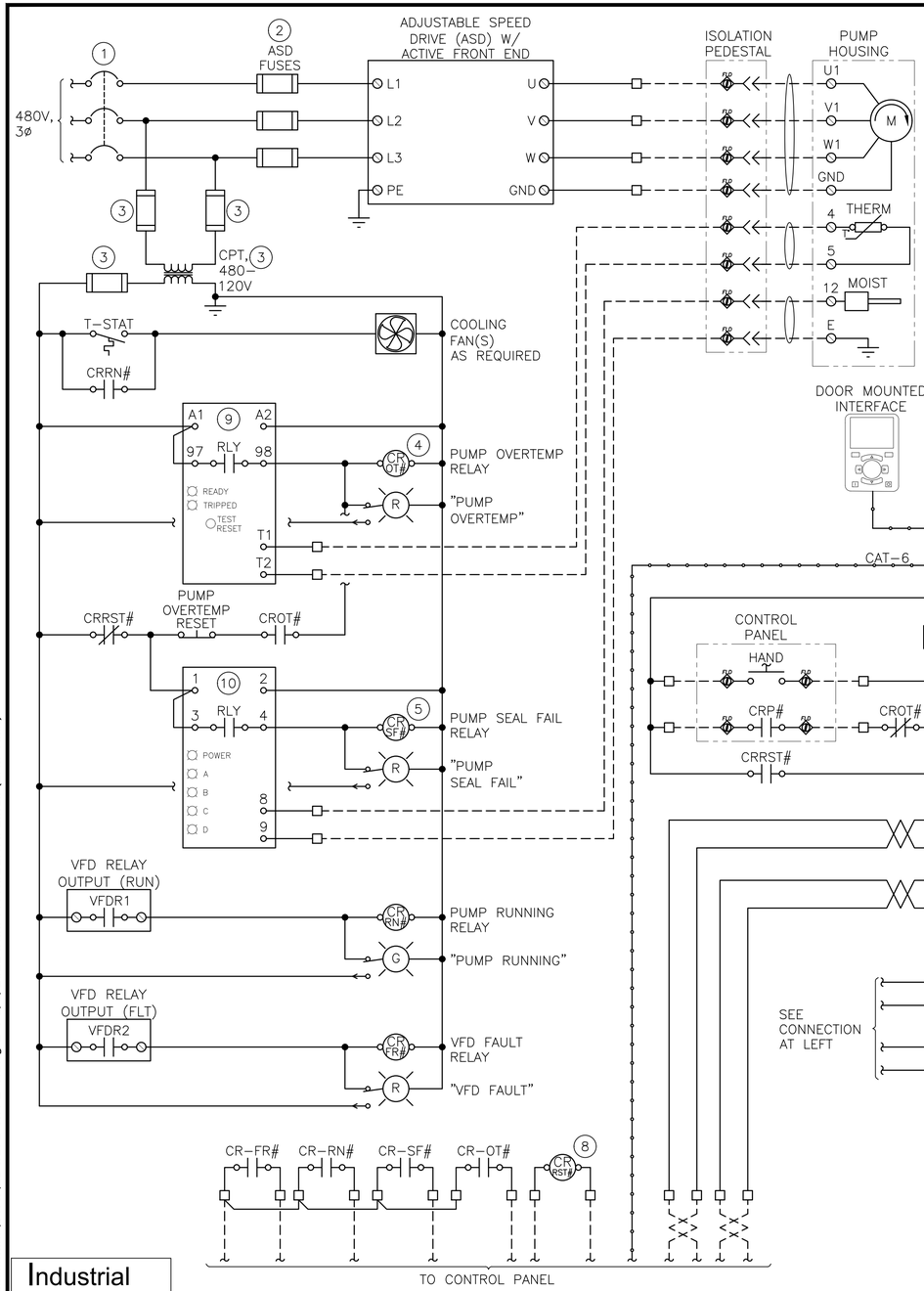
ISOLATION PEDESTAL CONSTRUCTION DETAILS

PROJECT NO.:	21-3171	SCALE:	AS SHOWN	DATE:	FEBRUARY 2022

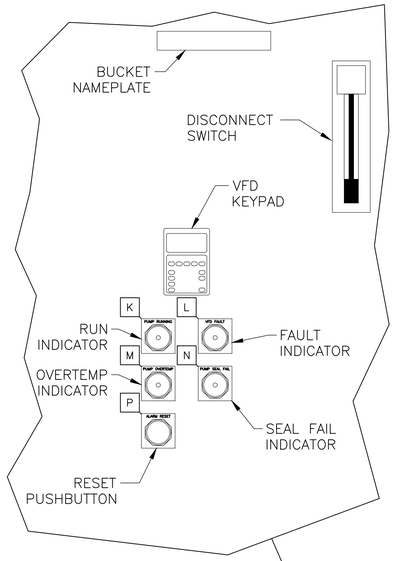
SHEET
E-8
X OF X



PUMP CONTROL VFD DIAGRAM (TYP)

DETAIL NOTE:
= 1 FOR PUMP 1
= 2 FOR PUMP 2
= 3 FOR PUMP 3

EXAMPLE PUMP 1:
CROT1 – PUMP OVERTEMP RELAY
CRSF1 – PUMP SEAL FAIL RELAY
CRRN1 – PUMP RUNNING RELAY
CRFR1 – PUMP VFD FAULT RELAY
CRRST1 – PUMP FAULT RESET
CRP1 – PUMP CALL RELAY @ CONTROL PANEL



DETAIL (TYP 3)

A	ITEM	MCC NAMEPLATE SCHEDULE
	A	MCC MAIN DISCONNECT
	B	POWER MONITOR
	C	SURGE PROTECTIVE DEVICE
	D	LIGHTING PANEL "L"
	E	PANEL "L" XFMR
	F	SPARE – FUTURE SCRUBBER
	G	SPACE
	H	PUMP NO. 1
	I	PUMP NO. 2
	J	PUMP NO. 3
	K	PUMP RUNNING
	L	VFD FAULT
	M	PUMP OVERTEMP
	N	PUMP SEAL FAIL
	P	PUMP OVERTEMP RESET

KEY NOTES

1. CIRCUIT BREAKER SIZING AS REQUIRED BY MANUFACTURER.
2. FUSING FOR SCR PROTECTION, IF REQUIRED BY MANUFACTURER.
3. FUSING AND CPT SIZED PER MANUFACTURER'S RECOMMENDATIONS.
4. TEMPERATURE RELAY WILL BE ENERGIZED WHEN THERE IS A TEMPERATURE ALARM.
5. SEAL FAIL RELAY WILL BE ENERGIZED WHEN THERE IS A SEAL LEAK ALARM.
6. CONFIGURE VFD INPUT TO SELECT LOCAL KEYPAD FOR START/STOP AND SPEED CONTROL.
7. VFD FAULT PROGRAM CONTACT TO BE NORMALLY CLOSED HELD OPEN AND CLOSES ON FAULT OR POWER LOSS.
8. RELAY TO BE 24VDC.
9. PUMP OVERTEMP RELAY, SIEMENS #3RN1012–1CK00 TO BE PROVIDED BY PUMP MFR. CONTRACTOR TO COORDINATE WITH MCC MFR FOR INSTALL.
10. PUMP SEAL FAIL RELAY, R–K ELECTRONICS #IS4R–120A–R–50K TO BE PROVIDED BY PUMP MFR. CONTRACTOR TO COORDINATE WITH MCC MFR FOR INSTALL.

MCC ELEVATION

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MCC LAYOUT AND VFD WIRING DIAGRAM

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SHEET
E-9
X OF X

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LOAD SUMMARY

	Voltage	480	3 Phase	4 Wire
QTY.	DESCRIPTION	LOAD KVA	LOAD HP	Amperes @ 480 VAC
1	PUMP 1	22.45	20.00	27.0
1	PUMP 2	22.45	20.00	27.0
1	PUMP 3	22.45	20.00	27.0
1	FUTURE AIR SCRUBBER	2.83	2.00	3.4
	NON MOTOR LOADS			
1	TRANSFORMER	15.0		18.0
1**	GENERATOR BLOCK HEATER	1.0		
1**	ISOLATION PEDESTAL HEATER	0.15		
1**	HOT WATER HEATER	1.5		
1**	HEAT PUMP	2.5		
1**	LIGHTING	0.37		
1**	RECEPTACLES	1.08		
	** - LOADS INCLUDED IN XFMR LOAD			
	SUBTOTAL		62.0	102.4
	LARGEST MOTOR X 25%	5.61		6.8
	NON-MOTOR LOADS X 25%	3.74		4.5
	SPARE CAPACITY (20%)	21.28		25.6
	TOTAL			139.3

GENERATOR LOAD CHART

LOAD REQUIREMENTS			PERFORMANCE REQUIREMENTS	
RUNNING kW	65.1		NOMINAL 480V, 60HZ, 3PH	
RUNNING kVA	75.9		MAX. VOLTAGE DIP %	20.0
RUNNING P.F.	0.9		MAX. FREQUENCY DIP %	10.0
MAX. START kW	26.8	IN STEP 1	MAX. VOLTAGE HARMONIC DISTORATION %	10.0
MAX. START kVA	34	IN STEP 1	MIN. GENERATOR LOADED %	30.0
			MAX. GENERATOR LOADED %	90.0
			TOTAL kW REQUIRED	80.0
			TOTAL AMPS REQUIRED	120.0

GENERATOR SIZING BASED ON THE FOLLOWING STEP CONFIGURATION:
STEP 1 - TRANSFORMER - FULL LOAD
FUTURE AIR SCRUBBER
STEP 2 - PUMP 1
STEP 3 - PUMP 2
STEP 4 - PUMP 3

CONSTRUCTION NOTE : CONDUIT INSTALLATION

1. ALL STRUT MOUNTING HARDWARE MUST BE STAINLESS STEEL.
2. MYERS HUB FITTING MUST BE USED ON ALL CONDUIT PENETRATIONS INTO ENCLOSURES.
3. ALL CONDUIT MUST BE PVC COATED GALVANIZED RIGID.
4. THE PROPER TOOLS MUST USED WHILE CUTTING, THREADING, BENDING AND TIGHTENING ANY PVC COATED CONDUIT.
5. THE PVC COATING MUST REMAIN INTACT; ONLY 1 INCH OF THE COATING MAY BE REMOVED AT THE END OF THE CONDUIT TO ALLOW FOR THREADING.
6. ANY CONDUIT WITH THE DAMAGED COATING MUST BE REPLACED.
7. THE COATING TOUCH–UP PAINT IS TO BE USED FOR COSMETIC BLEMISHES.
8. ALL THREADED CONNECTIONS MUST BE COPPER COATED AND TIGHTENED APPROPRIATELY.
9. ALL UNDERGROUND CONDUIT RUNS MUST BE INSPECTED BEFORE THEY CAN BE COVERED.
10. CORE AND INSTALL LINK SEAL ON ALL CONDUIT PENETRATIONS INTO BELOW GRADE STRUCTURES, I.E. VAULTS AND WET WELL.

CONDUIT AND WIRE SCHEDULE

CONDUIT USE	CONDUIT DESIGNATION	CONDUIT SIZE	CONDUIT TYPE	CONDUCTOR SIZE AND NUMBER OF CONDUCTORS	CONDUIT FROM	CONDUIT TO
	A					
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					
	N					
	O					
	P					
	Q					
	R					
	S					
	T					
	U					
	V					
	W					
	X					
	Y					
	Z					
	AA					
	BB					
	CC					
	DD					
	EE					
	FF					
	GG					
	HH					
	JJ					
	KK					
	LL					

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LOAD TABLES AND CONDUIT SCHEDULE

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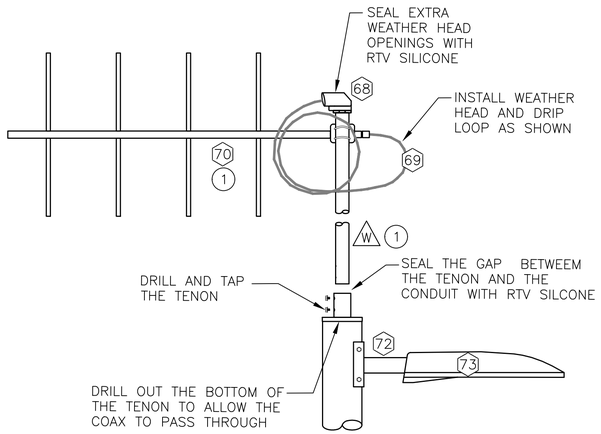
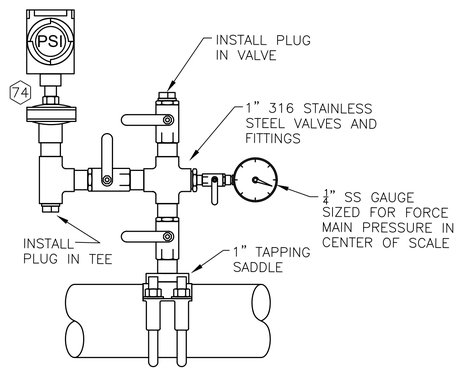
SHEET
E-10
X OF X

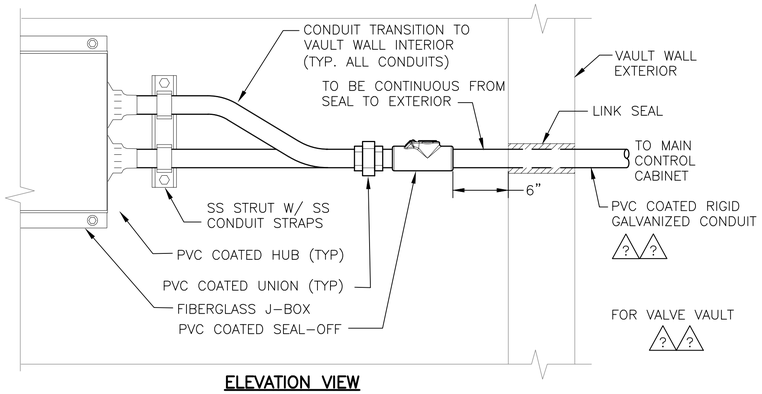
LIGHT POLE INSTALLATION DETAIL



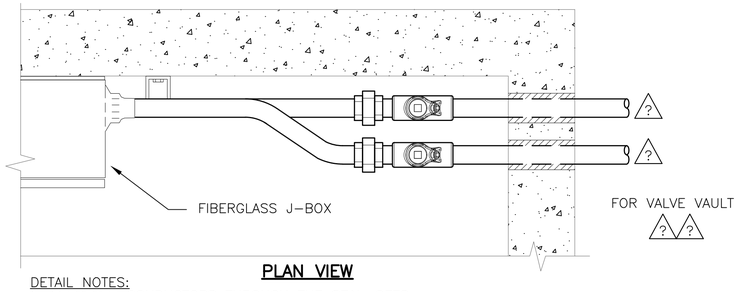
PSI TRANSMITTER INSTALLATION DETAIL



VALVE VAULT AND FLOWMETER VAULT SEAL-OFF INSTALLATION DETAIL



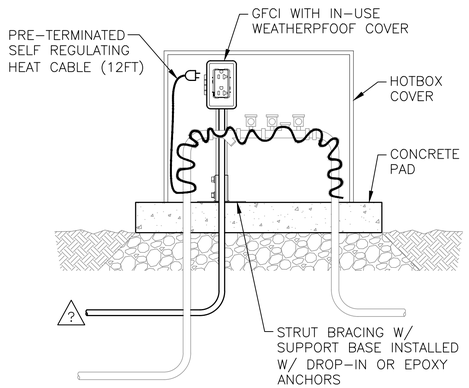
ELEVATION VIEW



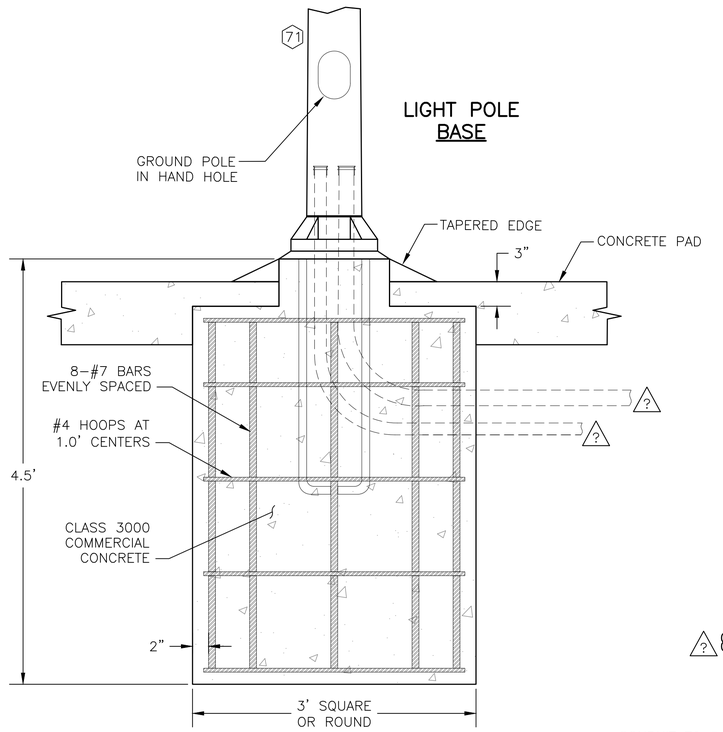
PLAN VIEW

DETAIL NOTES:
1. SEPARATE CONDUCTORS THROUGH THE SEAL-OFFS WITH APPLETON FOI FIBER FILLER AND FILL WITH APPLETON AC1A SEALING CEMENT.
2. SEAL SPARE CONDUIT WITH DUCT SEALING COMPOUND
3. USE COPPER COAT ON CONDUIT THREADS, UNION THREADS AND SEAL-OFF CAPS.

HOT BOX GFCI INSTALLATION DETAIL

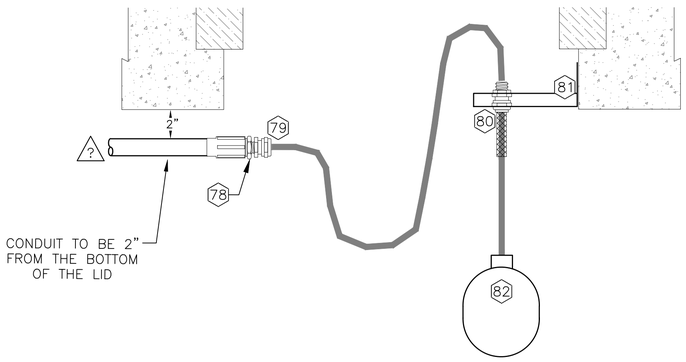


LIGHT POLE BASE

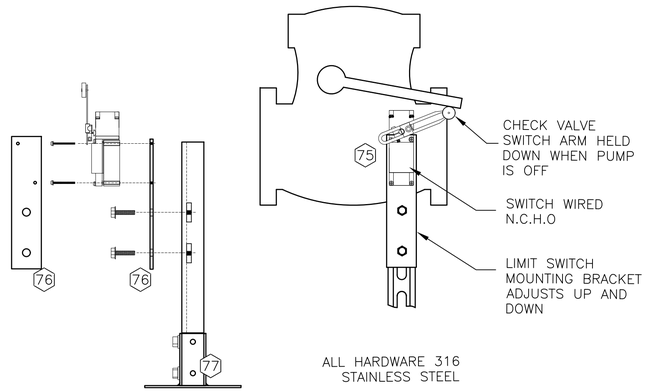


DETAIL NOTES:
1. THE FOUNDATION IS DESIGNED FOR 2000 PSF AVERAGE SOIL LATERAL BEARING PRESSURE.
2. BOLT PATTERN PER MANUFACTURER'S SPECIFICATIONS.
3. FOR DETAILS NOT SHOWN USE MANUFACTURER'S SPECIFICATIONS AND DETAILS.

HIGH BALL INSTALLATION DETAIL



SWING CHECK VALVE INSTALLATION DETAIL



ALL HARDWARE 316 STAINLESS STEEL

KEY NOTES

1. OVERALL HEIGHT AND AIMING OF ANTENNA SHALL BE COORDINATED WITH CITY PERSONNEL.

SHEET LAYOUT KEY:

68. 1-1/2" WEATHER HEAD
69. ANTENNA CABLING
70. ANTENNA
71. 16' LIGHT POLE WITH TENNON TOP
72. LUMINAIRE MOUNTING BRACKET
73. LED LUMINAIRE
74. PRESSURE TRANSMITTER ASSEMBLY
75. CHECK VALVE SWITCH ASSEMBLY
76. LIMIT SWITCH MOUNTING BRACKET
77. LIMIT SWITCH POST BASE
78. 1" X 1/2 " SS REDUCER BUSHING
79. SS CORD GRIP
80. SS CORD GRIP WITH STRAIN RELIEF
81. HIGH BALL MOUNTING BRACKET
82. HIGH BALL

△ CONDUIT PENETRATIONS. SEE CONDUIT SCHEDULE SHEET

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OR CCB #196597 WA #INDUSSI880K9
AK #1018436
PROJECT#: 21.07.01

60% SUBMITTAL

NO.	DATE	BY	REVISION

NOTICE
0 ½ 1
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RSC DRAWN
TBC CHECKED

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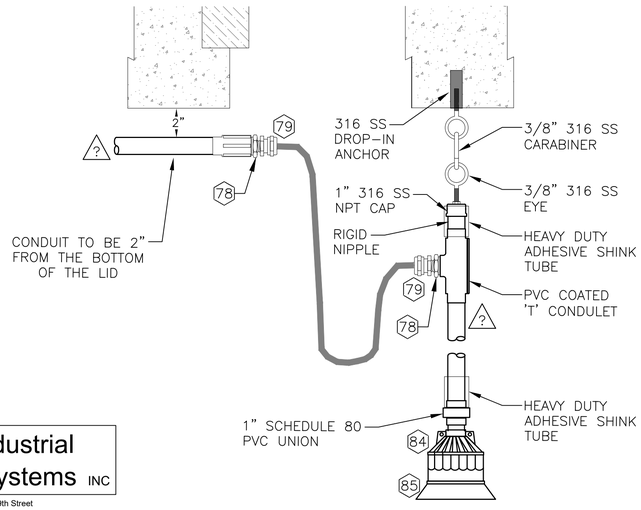
FIELD ELECTRICIAN CONSTRUCTION DETAILS SHEET 1

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
E-11
X OF X

LEVEL TRANSDUCER INSTALLATION DETAIL



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SHEET LAYOUT KEY:

- 78 1" X 1/2 " SS REDUCER BUSHING
- 79 SS CORD GRIP
- 84 LEVEL TRANSDUCER
- 85 SUBMERGENCE SHIELD
- △ CONDUIT PENETRATIONS. SEE CONDUIT SCHEDULE SHEET

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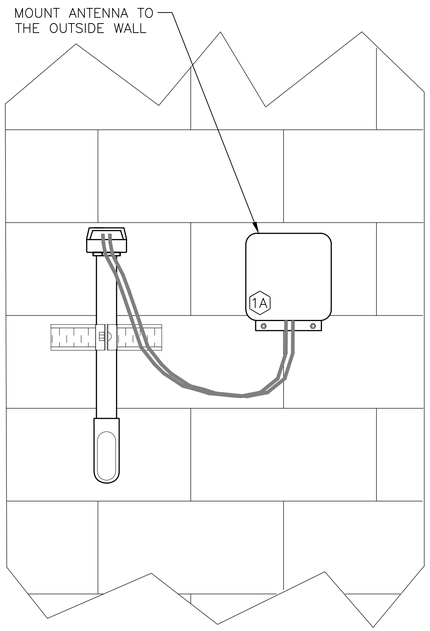
FIELD ELECTRICIAN CONSTRUCTION DETAILS SHEET 2

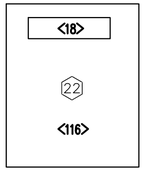
PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
E-12
X OF X

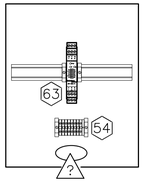
CELL ANTENNA INSTALLATION DETAIL



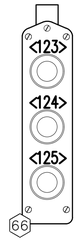
INTRINSICALLY SAFE RELAY PANEL EXTERIOR

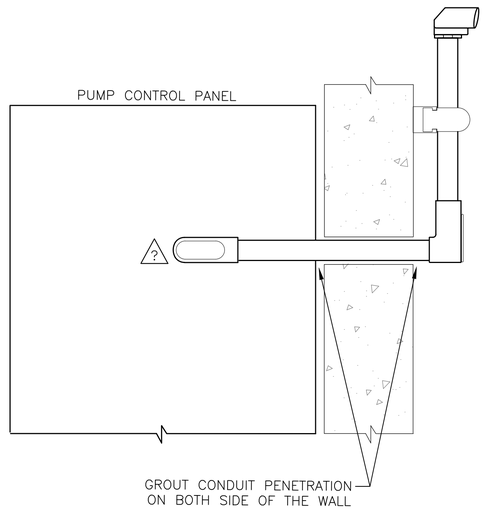


INTRINSICALLY SAFE RELAY PANEL INTERIOR



PUMP JOG PENDANT





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PROJECT#.21.07.01

SHEET LAYOUT KEY:

- 1A — CELL MODEM
- 22 — INSTRINSICALLY SAFE RELAY PANEL ENCLOSURE
- 54 — TERMINAL BLOCKS
- 63 — INTRINSICALLY SAFE RELAY
- 66 — PUMP JOG PENDANT
- △ — CONDUIT PENETRATIONS. SEE CONDUIT SCHEDULE SHEET
- ◇◇ — SEE LABEL SCHEDULE SHEET

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FIELD ELECTRICIAN CONSTRUCTION DETAILS SHEET 3

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SHEET
E-13
X OF X

SPACE RESERVED FOR
BILL OF MATERIALS

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APPROVED MATERIALS LIST (BOM) SHEET 1

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SHEET
E-14
X OF X

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APPROVED MATERIALS LIST (BOM) SHEET 2

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
E-15
X OF X

Phenolic Legends

1-1/2" X 7-1/2" Red background with white 3/8" letters, text to include:	4-1/2" X 7-1/2" Black background with white 1/4" letters, text to include:	1-1/2" X 7-1/2" Black background with white 3/16" letters, text to include:	1-1/2" X 6" Black background with white 1/2" letters, text to include:
<1> 277/480 3ø 200 AMPS	<2> SERVICE/METER DISCONNECT FEEDS ATS IN ELECTRICAL ROOM FED BY STANDBY GENERATOR NORTHEAST OF BUILDING	<3> LIFT STATION #3 4406 26TH AVE SE LACEY, WA 98503	<4> NOT USED
1-1/2" X 5" Red background with white 1/4" letters, text to include:	1-1/2" X 5" Black background with white 3/8" letters, text to include:	1-1/2" X 6" Black background with white 3/8" letters, text to include:	3/4" X 2-1/2" Black background with white 3/8" letters, text to include:
<5> SERVICE DISCONNECT ON THE EXTERIOR OF BUILDING	<6> BREAKER PANEL	<7> PUMP CONTROL PANEL	<8> PUMP 1
3/4" X 2-1/2" Black background with white 3/8" letters, text to include:	3/4" X 2-1/2" Black background with white 3/8" letters, text to include:	1-3/4" X 2" Black background with white 5/32" letters, text to include:	1-3/4" X 2" Black background with white 5/32" letters, text to include:
<9> PUMP 2	<10> PUMP 3	<12> CONTROL POWER	<13> HIGH WET WELL OVERRIDE SELECT P1 P2
1-3/4" X 2" Black background with white 5/32" letters, text to include:	1-3/4" X 2" Black background with white 5/32" letters, text to include:	1-3/4" X 2" Black background with white 5/32" letters, text to include:	3/4" X 3" Black background with white 3/16" letters, phenolic width to match HOA width, text to include:
<13> HIGH WET WELL OVERRIDE SELECT 1+3 2+3 1+2	<14> HIGH WET WELL LEVEL RESET	<15> HAND-OFF-AUTO	<16> PUMP 1
3/4" X 3" Black background with white 3/16" letters, phenolic width to match HOA width, text to include:	3/4" X 3" Black background with white 3/16" letters, phenolic width to match HOA width, text to include:	1-1/2" X 5" Black background with white 3/8" letters, text to include:	1-1/2" X 5" Black background with white 3/8" letters, text to include:
<17> PUMP 2	<18> PUMP 3	<19>	<20> ISR PANEL
1-1/2" X 5" Black background with white 3/8" letters, text to include:	1-1/2" X 5" Red background with white 3/16" letters, text to include:	1-1/2" X 5" Black background with white 3/8" letters, text to include:	
<21> ISOLATION PEDESTAL	<22> NOT USED	<23>	

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PHENOLIC LEGENDS

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET
E-16
X OF X

P:\Projects\21.65.01_MSA_Lacey_LS3_Relacement\DWG\21-3171-WA-E-16.dwg E-16 2/14/2022 9:30 AM ROBERTC 23.1s (LMS Tech)

Vinyl Labels

Emedco part number SQS116 text to include:	Emedco part number SQS9 text to include:	Emedco part number SQ3784 text to include:	
<25> DANGER 480 VOLTS	<26> CAUTION THIS EQUIPMENT IS SUPPLIED BY MORE THAN ONE POWER SOURCE	<35> WARNING ARC FLASH AND SHOCK HAZARD APPROPRIATE PPE REQUIRED FAILURE TO COMPLY CAN RESULT IN DEATH OR INJURY.	

White background with 18 point black font, text to include:

<27> PHASE MONITOR	<28> TVSS	<29> F1 F2 F3 KTK-R-1/10	<30> CB-TVSS	<31> ESW1	<32> ESW2	<33> UPS	<34> AREA LIGHT
<36> PS-1	<37> PS-2	<38> CBL	<39> CB-UPS	<40> CB-SPR	<42> LPC	<44> CB-LPC	

White background with black font, text to include: (label to include fuse name, type and size)

<45> DCF-R TYPE SIZE	<46> DCF-EW TYPE SIZE	<47> DCF-CM TYPE SIZE	<48> DCF-ES TYPE SIZE	<49> DCF-PV TYPE SIZE	<50> DCF-DI TYPE SIZE	<51> DCF-DO TYPE SIZE	<52> DCF–SP TYPE SIZE
<53> DCF-FLD TYPE SIZE	<54> DCF–AI0 TYPE SIZE	<55> DCF–AI1 TYPE SIZE	<56> DCF-AI2 TYPE SIZE	<57> DCF-AI3 TYPE SIZE	<68> DCF-AI4 TYPE SIZE	<69> DCF-AI5 TYPE SIZE	<70> DCF-AI6 TYPE SIZE

White background with 18 point black font, text to include: {Mount on back plate}

<58> CR-5–PULSE	<59> TD-1	<60> TD-2	<61> TD-3	<63> CR-1	<64> CR-2	<65> CR-3	<66> CR-4
<67> CR-4A		<71>	<72> CR-P1	<73> CR-P2	<74> CR-P3	<75> CR-RSF1	<76> CR-RSF2
<77> CR-RSF3							

White background with black font, text to include: (label to include fuse name, type and size)

<78> ACF-PLC TYPE SIZE	<79> ACF–P1 TYPE SIZE	<80> ACF-LC TYPE SIZE	<81> ACF–FM TYPE SIZE	<82> ACF–P2 TYPE SIZE	<83> ACF–AC1 TYPE SIZE	<84> ACF–IS1 TYPE SIZE	<85> DCF-AI7 TYPE SIZE
<86> DCF-AO1 TYPE SIZE	<87> DCF-AO2 TYPE SIZE	<88> DCF-AO3 TYPE SIZE	<89> DCF-AO4 TYPE SIZE				

White background with 18 point black font, text to include:

<90> SEAL FAIL 1	<91> SEAL FAIL 2	<92> SEAL FAIL 3	<94> CB1	<95> CB2	<96> CB3	<98> P1	<99> SS-1
<100> SS-2	<101> SS-3	<102> P2					

White background with 24 point black font, text to include:

<104> NOT USED	<105> NOT USED	<106> NOT USED	<107> RPBA HEAT TAPE
<107> RPBA/AIR RELEASE HEAT TAPE	<108> ISOLATION PEDESTAL HEATER	<109> PUMP PANEL 120 VAC CONTROL POWER	<110> UPS RECEPTACLE
<111> OUTSIDE AREA LIGHT	<112> GENERATOR BATTERY CHARGER	<113> GENERATOR BLOCK HEATER	

Red or yellow background with black 5/32" letters, text to include:

<116> WARNING: To prevent ignition of flammables or combustible atmospheres, disconnect power before servicing. This panel provides intrinsically safe circuit extensions for use in CLASS 1 GROUP D HAZARDOUS LOCATIONS when connected per (Control System Manufacturer) drawing package (number).	<117> Apply red tape to the floor of the MAIN CONTROL CABINET to designate intrinsically safe area. (Only intrinsically safe circuits are allowed in this area. No conduit should be closer than 2" to the red line.)

White background with 18 point black font, text to include:

<118> HIGH BALL	<119> PUMP 1	<120> PUMP 2	<121> PUMP 3				

White background with black font, text to include: (Sized to fit)

<123> PUMP 1	<124> PUMP 2	<125> PUMP 3	<127> EMERGENCEY POWER	<128> LOAD BANK	<129> BATTERY CHARGER	<130> BLOCK HEATER	<131> NOT USED

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VINYL LABELS

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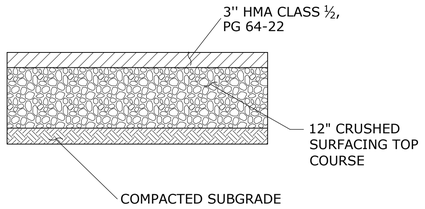
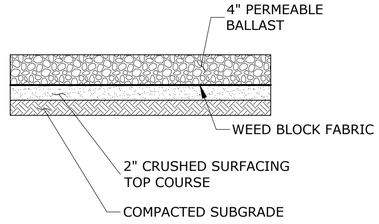
SHEET
E-17
X OF X



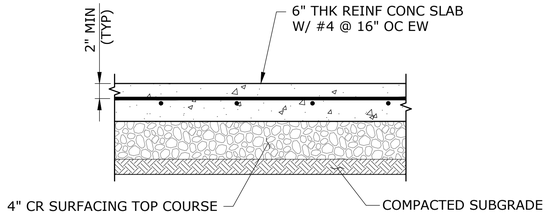
ASPHALT PAVEMENT 1

SCALE: NTS



GRAVEL SURFACING 2

SCALE: NTS

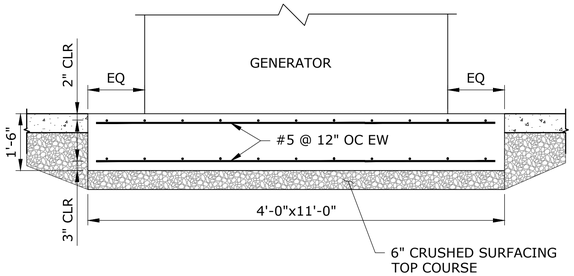


NOTE:

1. CONCRETE SHALL BE COMMERCIAL CONCRETE CLASS 3000 OR BETTER, REINFORCING STEEL ASTM A615 GRADE 60.

CONCRETE SURFACING 3

SCALE: NTS



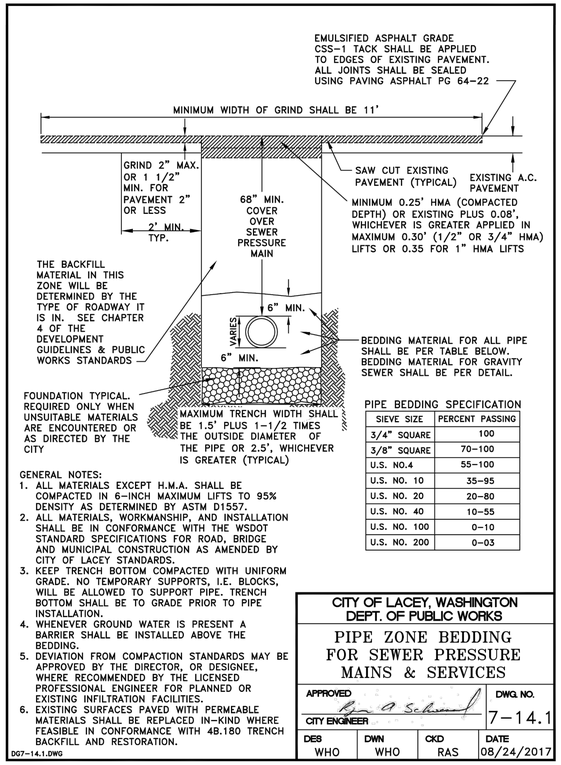
NOTE:

1. GENERATOR SUPPLIER TO DESIGN PAD DIMENSIONS AND PROVIDE ANCHORAGE DESIGN.

2. CONCRETE SHALL BE COMMERCIAL CONCRETE CLASS 3000 OR BETTER, REINFORCING STEEL ASTM A615 GRADE 60.

GENERATOR PAD 4

SCALE: NTS



PIPE BEDDING SPECIFICATION

SIEVE SIZE	PERCENT PASSING
3/4" SQUARE	100
3/8" SQUARE	70-100
U.S. NO.4	55-100
U.S. NO. 10	35-95
U.S. NO. 20	20-80
U.S. NO. 40	10-55
U.S. NO. 100	0-10
U.S. NO. 200	0-03

GENERAL NOTES:

1. ALL MATERIALS EXCEPT H.M.A. SHALL BE COMPACTED IN 6-INCH MAXIMUM LIFTS TO 95% DENSITY AS DETERMINED BY ASTM D1557.
2. ALL MATERIALS, WORKMANSHIP, AND INSTALLATION SHALL BE IN CONFORMANCE WITH THE WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION AS AMENDED BY CITY OF LACEY STANDARDS.
3. KEEP TRENCH BOTTOM COMPACTED WITH UNIFORM GRADE. NO TEMPORARY SUPPORTS, I.E. BLOCKS, WILL BE ALLOWED TO SUPPORT PIPE. TRENCH BOTTOM SHALL BE TO GRADE PRIOR TO PIPE INSTALLATION.
4. WHENEVER GROUND WATER IS PRESENT A BARRIER SHALL BE INSTALLED ABOVE THE BEDDING.
5. DEVIATION FROM COMPACTION STANDARDS MAY BE APPROVED BY THE DIRECTOR, OR DESIGNEE, WHERE RECOMMENDED BY THE LICENSED PROFESSIONAL ENGINEER FOR PLANNED OR EXISTING INFILTRATION FACILITIES.
6. EXISTING SURFACES PAVED WITH PERMEABLE MATERIALS SHALL BE REPLACED IN-KIND WHERE FEASIBLE IN CONFORMANCE WITH 4B.180 TRENCH BACKFILL AND RESTORATION.

D07-14.1.DWG

CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

PIPE ZONE BEDDING FOR SEWER PRESSURE MAINS & SERVICES

APPROVED CITY ENGINEER	DWG. NO.
	7-14.1

DES	DWN	CKD	DATE
WHO	WHO	RAS	08/24/2017

TRENCH RESTORATION FOR PAVED AREAS 5

SCALE: NTS

60% SUBMITTAL

NO.	DATE	BY	REVISION

NOTICE

0 ½ 1

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MNF DRAWN
PBC CHECKED

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PER WAC 196-23-020(3)
February 4, 2022
48352
REGISTERED PROFESSIONAL ENGINEER
murraysmith

murraysmith

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CITY OF LACEY

CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

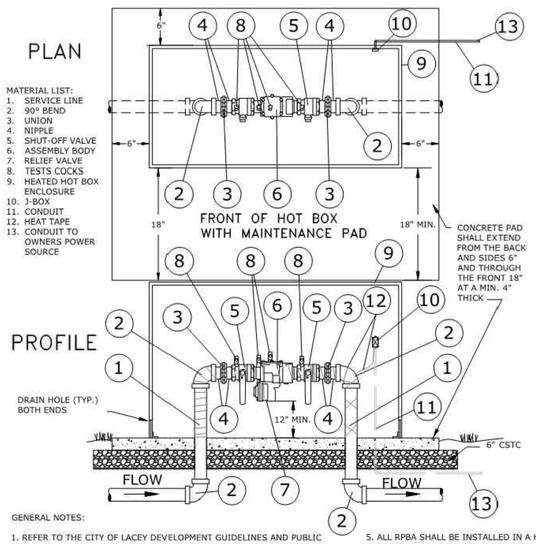
TYPICAL DETAILS - 1

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET **D-1**

47 of 51

K:\TAC_Projects\21\3171 - Lacey - LS3 Replacement\CAD\Sheets\21-3171-WA-D1.dwg D-1 2/18/2022 3:14 PM MATT.ESTEP 23.0s (LMS Tech)



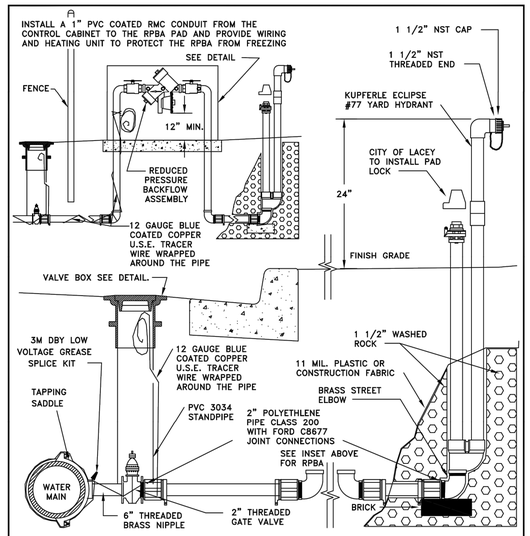
GENERAL NOTES:

1. REFER TO THE CITY OF LACEY DEVELOPMENT GUIDELINES AND PUBLIC WORKS STANDARDS, SECTION 6.110, BACK-FLOW PREVENTION, FOR SELECTION AND INSTALLATION DETAILS.
2. THE BPA (BACKFLOW PREVENTION ASSEMBLY) INSTALLATION SHALL BE INSPECTED AND APPROVED BY A CITY OF LACEY CROSS-CONNECTION CONTROL SPECIALIST (CCS), PRIOR TO TESTING.
3. WHEN THE INSTALLATION HAS BEEN APPROVED BY THE LACEY CCS, THE RPBA MUST PASS A FUNCTIONALITY TEST BY A WASHINGTON STATE CERTIFIED BAT AS PER DOH STANDARDS.
4. DO NOT INSTALL IN AREA SUBJECT TO FLOODING.
5. ALL RPBA SHALL BE INSTALLED IN A HOT BOX EQUIPPED WITH ELECTRICAL COMPONENTS (CONDUITS, WIRING, ETC.) AND POWER SUPPLIED BY THE OWNER TO PREVENT THE UNIT FROM FREEZING.
6. ALL PIPING AND FITTINGS SHALL BE DOMESTIC BRASS MANUFACTURED IN THE U.S.A.
7. DRAIN HOLE OPENINGS SHALL BE 1 1/2 TIMES THE DIAMETER OF THE SUPPLY LINE.
8. THE HOT BOX SHALL BE NEUTRAL BEIGE.

REDUCED PRESSURE BACKFLOW ASSEMBLY FOR 3" OR SMALLER (OUTDOOR APPLICATION)

1 / -

SCALE: NTS



GENERAL NOTES:

1. THE WATER MAIN IS LOCATED 6' NORTH OR EAST OF THE CENTERLINE.
2. THE BROKEN LINES INDICATE A MISSING DISTANCES. ALL DISTANCES SHALL BE SHOWN ON THE PLANS.
3. TWO (2) COATS OF RED EPOXY PAINT IS REQUIRED AFTER INSTALLATION.
4. INSTALL A RPBA WITHIN THE FENCED AREA WITH NO OBSTRUCTIONS AROUND IT. SEE DETAIL.
5. THE WASH HYDRANT SHALL BE INSTALLED WITHIN THE FENCED AREA OF A LIFT STATION.
6. THE ENCLOSURE FOR THE RPBA SHALL BE A HOT BOX HB-200 WITH HEAT COIL.
7. TAP PER DETAIL.

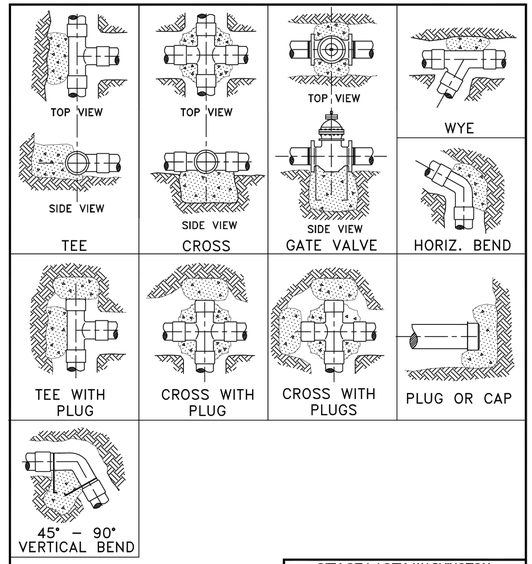
D07-78.0.DWG

CITY OF LACEY, WASHINGTON DEPT. OF PUBLIC WORKS			
LIFT STATION WASH HYDRANT			
APPROVED CITY ENGINEER			DWG. NO. 7-78.0
DES. WHO	DWN. WHO	CKD. RAS	DATE 08/24/2017

LIFT STATION WASH HYDRANT

2 / -

SCALE: NTS



GENERAL NOTES:

1. CONCRETE THRUST BLOCKING TO BE POURED AGAINST UNDISTURBED EARTH.
2. PLASTIC BARRIER SHALL BE PLACED BETWEEN ALL THRUST BLOCKS AND FITTIINGS.
3. ANCHOR REBAR SHALL BE 5/8" MINIMUM DIAMETER

D06-14.DWG

CITY OF LACEY, WASHINGTON DEPT. OF PUBLIC WORKS			
STANDARD BLOCKING DETAIL			
APPROVED CITY ENGINEER			DWG. NO. 6-14
DES. LRW	DWN. RLM	CKD. RAS	DATE 8/27/09

THRUST LOADS

THRUST AT FITTINGS IN POUNDS AT 200 POUNDS PER SQUARE INCH OF WATER PRESSURE

PIPE DIAMETER	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND	DEAD END OR TEE
4"	3,600	2,000	1,000	500	2,600
6"	8,000	4,400	2,300	1,200	5,700
8"	14,300	7,700	4,000	2,000	10,100
10"	22,300	12,100	6,200	3,100	15,800
12"	32,000	17,400	8,900	4,500	22,700
14"	43,600	23,600	12,100	6,100	30,800
16"	57,000	30,800	15,700	7,900	40,300

NOTES:

1. BLOCKING SHALL BE COMMERCIAL CONCRETE POURED IN PLACE AGAINST UNDISTURBED EARTH. FITTING SHALL BE ISOLATED FROM CONCRETE THRUST BLOCK WITH PLASTIC OR SIMILAR MATERIAL.
2. TO DETERMINE THE BEARING AREA OF THE THRUST BLOCK IN SQUARE FEET (S.F.):
   EXAMPLE : 12" - 90° BEND IN SAND AND GRAVEL
   32,000 LBS ÷ 3000 LB/S.F. = 10.7 S.F. OF AREA
3. AREAS MUST BE ADJUSTED FOR OTHER PIPE SIZE, PRESSURES AND SOIL CONDITIONS.
4. BLOCKING SHALL BE ADEQUATE TO WITHSTAND FULL TEST PRESSURE AS WELL AS TO CONTINUOUSLY WITHSTAND OPERATING PRESSURE UNDER ALL CONDITIONS OF SERVICE.

SAFE SOIL BEARING LOADS

FOR HORIZONTAL THRUSTS WHEN THE DEPTH OF COVER OVER THE PIPE EXCEEDS 2 FEET

SOIL	POUNDS PER SQUARE FOOT
MUCK, PEAT	0
SOFT CLAY	1,000
SAND	2,000
SAND & GRAVEL	3,000
SAND & GRAVEL CEMENTED WITH CLAY	4,000
HARD SHALE	10,000

D06-15.DWG

CITY OF LACEY, WASHINGTON DEPT. OF PUBLIC WORKS			
THRUST LOADS			
APPROVED CITY ENGINEER			DWG. NO. 6-15
DES. LRW	DWN. RLM	CKD. RAS	DATE 8/27/09

STANDARD BLOCKING DETAIL AND THRUST LOADS

3 / -

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NO.	DATE	BY	REVISION

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48352 REGISTERED PROFESSIONAL ENGINEER
murraysmith

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CITY OF LACEY

CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

TYPICAL DETAILS - 2

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET **D-2**

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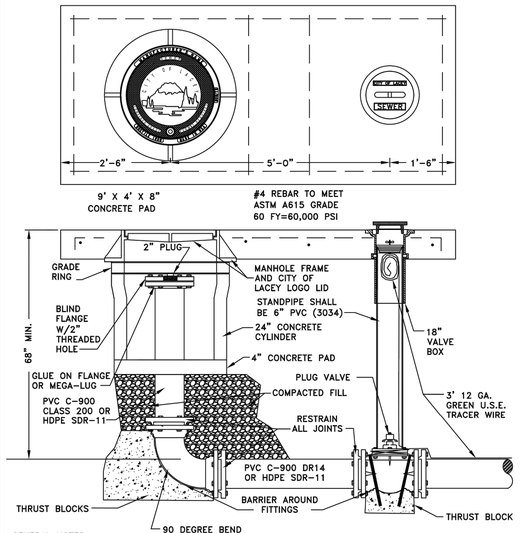


GENERAL NOTES:
1. FOR VALVE BOX AND VALVE STEM RISER REQUIREMENTS SEE DETAIL.
2. THE PIG LAUNCH SIZES SHALL BE THE SAME SIZE AS THE MAIN.
3. THE MANHOLE FRAME AND COVER SHALL BE THE CITY OF LACEY "LOGO" LID SEE DETAIL.
4. PIG LAUNCH 10" OR LARGER SHALL REQUIRE SPECIAL DESIGN AND APPROVAL BY THE CITY AND MAY REQUIRE A LARGER MANHOLE LID OPENING OR A SPECIAL VAULT.
5. IN A CUL-DE-SAC SCENARIO THE LAUNCH PORT SHALL END AT THE MIDDLE OF THE SAC.

CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

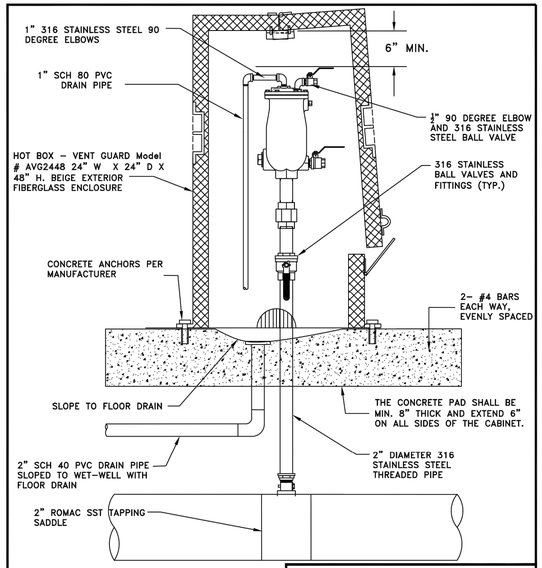
4" THRU 8" PIG LAUNCH ASSEMBLY

APPROVED / CITY ENGINEER	DWG. NO.
	7-21.0

DES.	DWN.	CKD.	DATE
WHO	WHO	RAS	08/24/2017

DG7-21.0.DWG

LAUNCH PORT 4" THRU 10"
SCALE: NTS
1 / -



GENERAL NOTES:
1. VALVE ASSEMBLY SHALL BE SET AT THE HIGH POINT OF THE LINE.
2. AIR RELEASE VALVES SHALL BE VAL-MATIC MODEL 801A WITH REGULATED EXHAUST AND MAY REQUIRE A LOW PRESSURE SEAT. ALTERNATE MODEL NUMBERS MAY BE REQUIRED BY THE CITY DEPENDING ON THE SPECIFIC APPLICATION.
3. AIR RELEASE MUST BE INSULATED WITH DeKORRA INSULATION BOOT PART NUMBER 610 CUSTOM SIZE 18" WIDE BY 36" TALL WITH OPENING ON THE 18" END.

CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

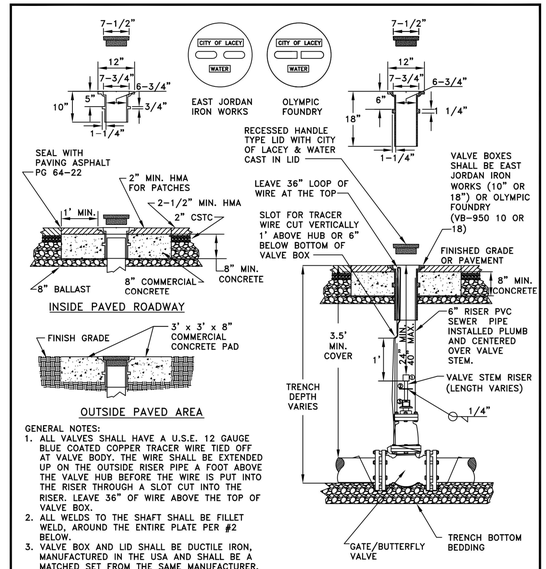
LIFT STATION AIR AND VACUUM RELEASE

APPROVED / CITY ENGINEER	DWG. NO.
	7-77.0

DES.	DWN.	CKD.	DATE
EBK	WHO	RAS	08/24/2017

DG7-77.0.DWG

AIR RELEASE VALVE (ARV)
SCALE: NTS
2 / -



GENERAL NOTES:
1. ALL VALVES SHALL HAVE A U.S.E. 12 GAUGE BLUE COATED COPPER TRACER WIRE TIED OFF AT VALVE BODY. THE WIRE SHALL BE EXTENDED UP ON THE OUTSIDE RISER PIPE A FOOT ABOVE THE VALVE HUB BEFORE THE WIRE IS PUT INTO THE RISER THROUGH A SLOT CUT INTO THE RISER. LEAVE 36" OF WIRE ABOVE THE TOP OF VALVE BOX.
2. ALL WELDS TO THE SHAFT SHALL BE FILLET WELD, AROUND THE ENTIRE PLATE PER #2 BELOW.
3. VALVE BOX AND LID SHALL BE DUCTILE IRON, MANUFACTURED IN THE USA AND SHALL BE A MATCHED SET FROM THE SAME MANUFACTURER.
4. EXISTING SURFACES PAVED WITH PERMEABLE MATERIALS SHALL BE REPLACED IN-KIND WHERE FEASIBLE IN CONFORMANCE WITH 4B.180 TRENCH BACKFILL AND RESTORATION.

VALVE STEM EXTENSION LEGEND
① VALVE OPERATING NUT OR 1-7/8" X 1-7/8" X 2" HIGH GRADE STEEL WELDED TO GUIDE PLATE.
② 3/16" THICK X 5 1/5" DIA STEEL GUIDE PLATE WELDED TO RISER SHAFT.
③ 2"X2"X 3/16" SQUARE STRUCTURAL STEEL TUBING TO FIT OPERATING NUT. LENGTH AS REQUIRED.

CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

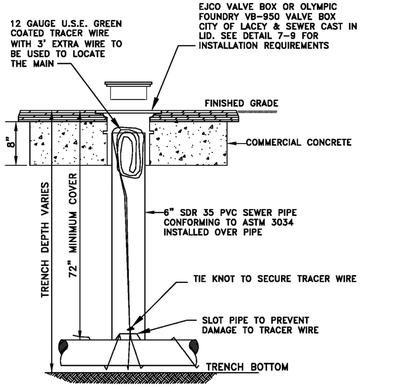
STANDARD VALVE BOX INSTALLATION

APPROVED / CITY ENGINEER	DWG. NO.
	6-12.0

DES	DWN	CKD	DATE
WHO	WHO	RAS	08/24/2017

DG6-12.0.DWG

STANDARD VALVE BOX
SCALE: NTS
3 / -



GENERAL NOTE:
1. TRACER WIRE ACCESS PORT SHALL BE INSTALLED EVERY 500 FEET WHEN NO APPURTENANCES ARE CONNECTED TO IT.

CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

LOCATE WIRE ACCESS PORT

APPROVED / CITY ENGINEER	DWG. NO.
	7-9.1

DES	DWN	CKD	DATE
EHA	WHO	RAS	12/15/2014

DG7-9.1.DWG

LOCATE WIRE ACCESS PORT
SCALE: NTS
4 / -

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NO.	DATE	BY	REVISION

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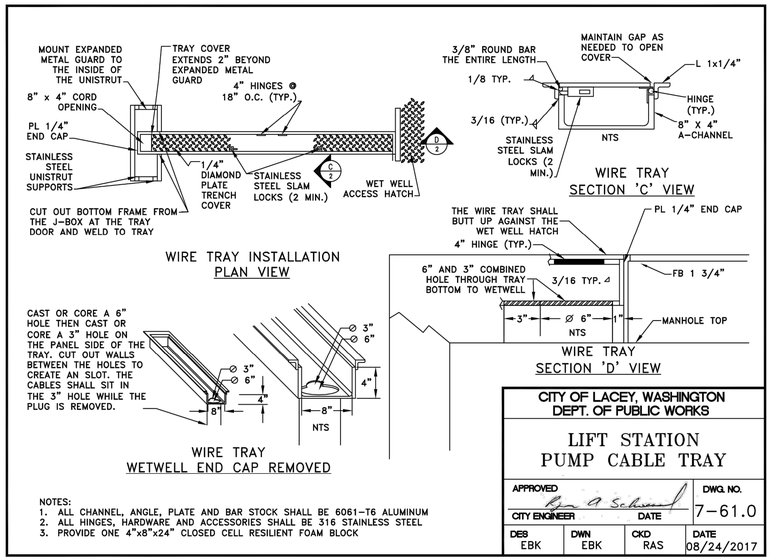
CITY OF LACEY

CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

TYPICAL DETAILS - 3

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET **D-3**



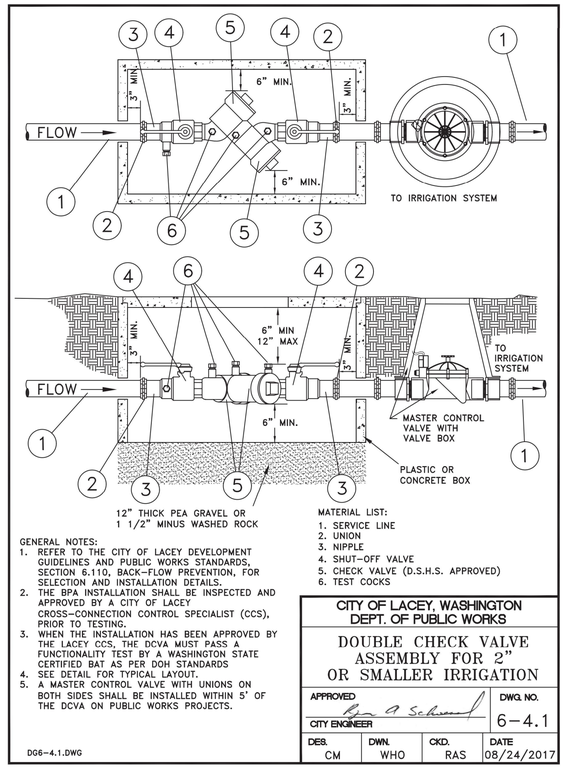
CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

LIFT STATION
PUMP CABLE TRAY

APPROVED	DWG. NO.
CITY ENGINEER / DATE	7-61.0

DES.	DWN.	CKD.	DATE
EBK	EBK	RAS	08/24/2017

PUMP CABLE TRAY (1 / -)
SCALE: NTS



GENERAL NOTES:
1. REFER TO THE CITY OF LACEY DEVELOPMENT GUIDELINES AND PUBLIC WORKS STANDARDS, SECTION 8.110, BACK-FLOW PREVENTION, FOR SELECTION AND INSTALLATION DETAILS.
2. THE BPA INSTALLATION SHALL BE INSPECTED AND APPROVED BY A CITY OF LACEY CROSS-CONNECTION CONTROL SPECIALIST (CCS), PRIOR TO TESTING.
3. WHEN THE INSTALLATION HAS BEEN APPROVED BY THE LACEY CCS, THE DCVA MUST PASS A FUNCTIONALITY TEST BY A WASHINGTON STATE CERTIFIED BAT AS PER DOH STANDARDS
4. SEE DETAIL FOR TYPICAL LAYOUT.
5. A MASTER CONTROL VALVE WITH UNIONS ON BOTH SIDES SHALL BE INSTALLED WITHIN 5' OF THE DCVA ON PUBLIC WORKS PROJECTS.

MATERIAL LIST:
1. SERVICE LINE
2. UNION
3. NIPPLE
4. SHUT-OFF VALVE
5. CHECK VALVE (D.S.H.S. APPROVED)
6. TEST COCKS

DG6-4.1.DWG

CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

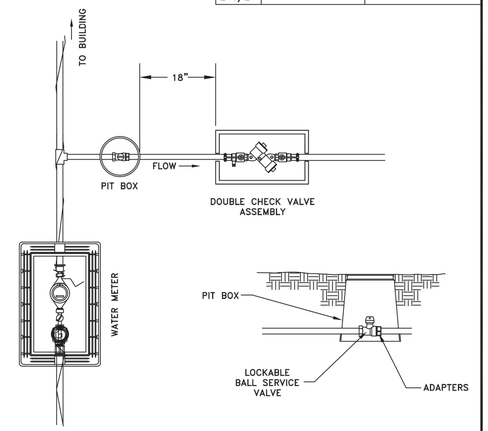
DOUBLE CHECK VALVE
ASSEMBLY FOR 2"
OR SMALLER IRRIGATION

APPROVED	DWG. NO.
CITY ENGINEER	6-4.1

DES.	DWN.	CKD.	DATE
CM	WHO	RAS	08/24/2017

DOUBLE CHECK VALVE ASSEMBLY (2 / -)
SCALE: NTS

LINE SIZE	BALL VALVE	VALVE BOX
3/4"	FORD FOB11-333W	CARSON MODEL 910-12
1"	FORD FOB11-444W	
1 1/2"	FORD FOB11-666W	
2"	FORD FOB11-777W	
2 1/2"	FORD FOB11-788W	



GENERAL NOTES:
1. THIS CONFIGURATION IS REQUIRED IF THE IRRIGATION SYSTEM DOES NOT HAVE IT'S OWN SEPARATE WATER METER.
2. DO NOT INSTALL IN AREAS SUBJECT TO FLOODING.

DG6-4.6.DWG

CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

IRRIGATION FOR
RESIDENTIAL DOMESTIC
SERVICE TYPE I

APPROVED	DWG. NO.
CITY ENGINEER	6-4.6

DES.	DWN.	CKD.	DATE
CM	WHO	RAS	12/15/2014

IRRIGATION SERVICE TYPE I (3 / -)
SCALE: NTS

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CITY OF LACEY

CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

TYPICAL DETAILS - 4

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET **D-4**

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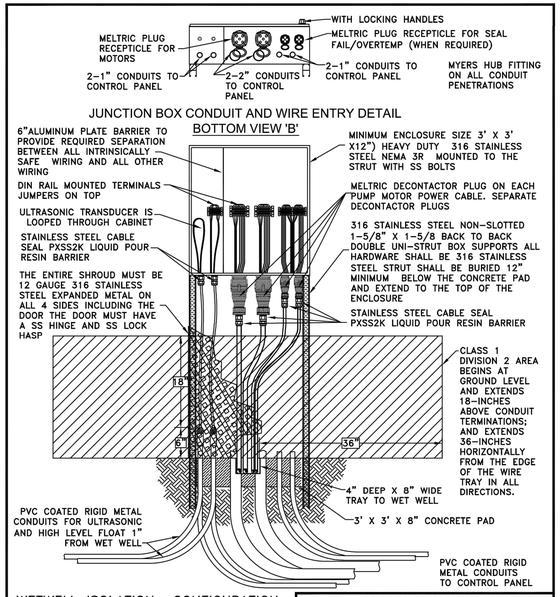
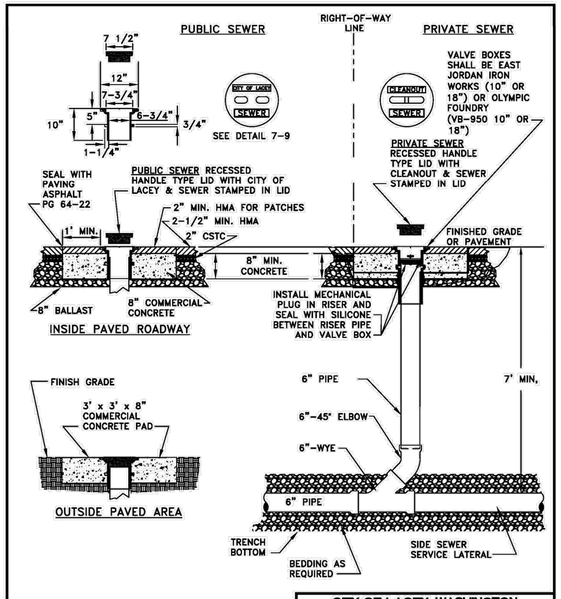


CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

WET WELL ELECTRICAL ISOLATION PEDESTAL

APPROVED Roger A Schaum CITY ENGINEER	DWG. NO. 7-17.3
DES WHO	DWN WHO
CKD RAS	DATE 12/15/2014

ISOLATION PEDESTAL (1)
SCALE: NTS

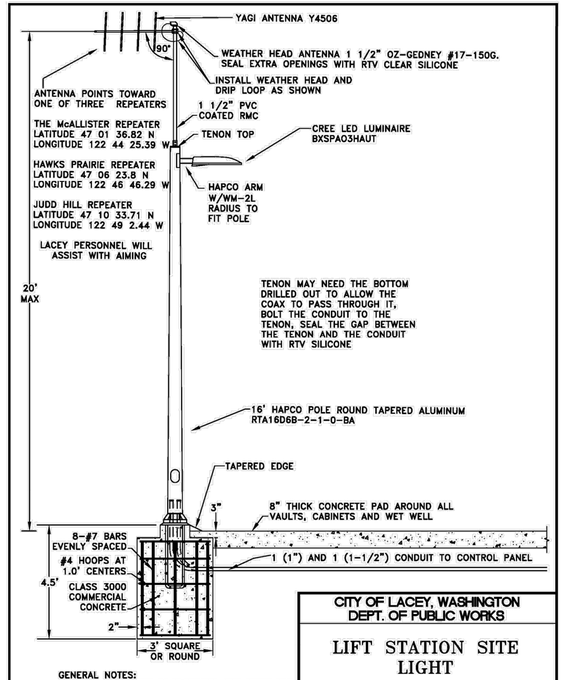


CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

CLEANOUT TYPE II PRIVATE

APPROVED Roger A Schaum CITY ENGINEER	DWG. NO. 7-5.1
DES WHO	DWN WHO
CKD RAS	DATE 12/15/2014

SEWER CONNECTION (2)
SCALE: NTS



CITY OF LACEY, WASHINGTON
DEPT. OF PUBLIC WORKS

LIFT STATION SITE LIGHT

APPROVED Roger A Schaum CITY ENGINEER	DWG. NO. 7-17.5
DES WHO	DWN WHO
CKD RAS	DATE 12/15/2014

SITE LIGHT (3)
SCALE: NTS

60% SUBMITTAL

NO.	DATE	BY	REVISION

NOTICE
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INITIAL3 CHECKED

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February 4, 2022

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CITY OF LACEY

CITY OF LACEY LIFT STATION NO. 3 REPLACEMENT

TYPICAL DETAILS - 5

PROJECT NO.: 21-3171 | SCALE: AS SHOWN | DATE: FEBRUARY 2022

SHEET **D-5**
51 of 51

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Attachment 4
Maintenance and Source Control Manual

Appendix B

Maintenance Tables and Log Sheets

1s. Downspout Infiltration

Downspout infiltration systems are trench or drywell designs intended only for use in infiltrating runoff from roof downspout drains.

Downspout Infiltration					
Drainage System Feature	**Problem or Defect**	**Conditions To Check For**	**√ Check**	**What To Do for Desired Condition**	**√ Done**
Rock Trench/Well	Inflow Disruption	Accumulated trash, debris, or sediment on drain rock surface impeding sheet flow into facility.		Sheet flow re-established. Material removed and disposed of in accordance with applicable solid waste requirements.	
	Inflow Disruption	Vegetation/moss present on drain rock surface impeding sheet flow into facility.		Material removed and sheet flow re-established.	
	Inflow Disruption	Water ponding at surface, or standing water in subgrade observation port.		Inflow to facility is consistent and no ponding is observed. Inlet piping is clear and/or rock or sand reservoirs have been replaced.	
Inlet/Outlet Pipe Conveyance	Conveyance Blockage	Accumulation of trash, debris, or sediment in roof drains, gutters, driveways drains, area drains, etc.		Conveyance systems are clear of debris and free-flowing.	
	Conveyance Blockage	Pipes to or from sump, trench, or drywell have accumulated sediment or is plugged.		Pipe systems are clear of debris and free-flowing.	
	Conveyance Damage	Pipes to or from sump, trench, or drywell is cracked, broken, or misaligned.		Pipe systems are undamaged and free-flowing.	
Roof Downspout	Splash Pad Malfunction	Splash pad missing or damaged.		Splash pad installed and functioning correctly	
	Overflow	Water overflows from the gutter or downspout during rain.		First try cleaning out the gutter and downspouts. If this doesn't solve the problem, a larger drywell may be needed. Contact the city before changing the design or upgrading to a larger drywell.	
Storage Sump	Sediment in Sump	Excess sediment accumulate in sump.		Material removed and disposed of in accordance with applicable solid waste requirements.	
	Access Lid Problems	Access lid cannot be opened or is missing.		Access lid is functioning as designed. Refer to record drawings to confirm type, function, and required components.	

Downspout Infiltration					
Drainage System Feature	**Problem or Defect**	**Conditions To Check For**	**√ Check**	**What To Do for Desired Condition**	**√ Done**
Roof	Moss	Moss and algae are taking over the shadier parts of the shingles.		Disconnect the flexible part of the downspout that leads to the drywell. Then perform moss removal as desired. Pressure wash or use fatty acid solutions instead of highly toxic pesticides or chlorine bleach. Install a zinc strip as a preventive.	

Log Sheet

Use copies of this log sheet to keep track of when maintenance inspections occur and what items, if any, are repaired or replaced. The completed sheets will serve as a record of past maintenance activities and will provide valuable information on how your facilities are operating. Keep all log sheets in a designated area so others can easily access them.

Location: _____	**Date Checked:**
Checked By: _____	_____
Name: _____	
Address: _____	**Phone:**
City: _____ **Zip:** _____	_____

Facility	Component Checked	Observations

Attachment 4
Maintenance and Source Control Manual

Appendix C

Stormwater Pollution Source Control Checklist and Worksheets

CITY OF LACEY

STORMWATER POLLUTION SOURCE CONTROL CHECKLIST

Project Name: Lift Station 3 Replacement

Check all activities that will occur at proposed project.

☐	Boat/Ship Building, Repair or Maintenance (see BMP S401)
☐	Commercial Animal Handling (see BMP S402)
☐	Commercial Composting (see BMP S403)
☐	Commercial Printing Operations (see BMP S404)
☐	De-Icing and Anti-Icing Operations- Airport and Streets (see BMP S405)
☐	Streets/ Highways (see BMP S406)
☒	Dust Control at Disturbed Land Areas and Unpaved Roadways and Parking Lots (see BMP S407)
☐	Dust Control at Manufacturing Areas (see BMP S408)
☐	Fueling at Dedicated Stations (see BMP S409)
☒	Landscaping and Lawn/Vegetation Maintenance (see BMP S411)
☐	Loading and Unloading of potential pollutants (see BMP S412)
☐	Log Sorting and Handling (see BMP S413)
☐	Maintenance and Repair of Vehicles and Equipment (see BMP S414)
☒	Maintenance of Public and Private Utility Corridors and Facilities (see BMP S415)
☐	Maintenance of Roadside Ditches (see BMP S416)
☒	Maintenance of Stormwater Drainage and Treatment Systems (see BMP S417)
☐	Manufacturing Activities- Outside (see BMP S418)
☐	Mobile Fueling of Vehicles and Heavy Equipment (see BMP S419)
☐	Painting/Finishing/Coating of Vehicles/Boats/Buildings/Equipment (see BMP S420)
☒	Parking and Storage of Vehicles and Equipment (see BMP S421)
☐	Railroad Yards (see BMP S422)
☐	Recyclers/Scrap Yards (see BMP S423)
☐	Roof/Building Drains at Manufacturing and Commercial Buildings (see BMP S424)
☐	Erosion and Sediment Control at Commercial or Industrial Sites (see BMP S425)
☒	Potential Spills of Oil or Hazardous Substances (see BMP S426)
☐	Storage of Liquids, Food Waste, or Dangerous Waste Containers (see BMP S427)

☒	Storage of Liquids in Permanent Aboveground Tanks (see BMP S428)
☐	Storage or Transfer (Outside) of Solid Raw Materials, By-products or Finished Products (see BMP S429)
☐	Urban Streets (see BMP S430)
☐	Washing and Steam Cleaning Vehicles/Equipment/Building Structures (see BMP S431)
☐	Wood Treatment Areas (see BMP S432)
☐	Spas, Pools, Hot Tubs, and Fountains (see BMP S433)

CITY OF LACEY

STORMWATER POLLUTION SOURCE CONTROL WORKSHEET

List All BMPs to be used at site. Use one worksheet for each activity from the checklist.

Project: Lift Station 3 Replacement Activity: S407 - Dust Control at Disturbed Land Areas and Unpaved Roadways and Parking Lots

OPERATIONAL BMPs
•Sprinkle or wet down soil or dust with water as long as it does not result in a wastewater discharge. •Use only dust suppressant chemicals that are approved by the local jurisdiction and/or state government approved dust suppressant chemicals •Avoid excessive and repeated applications of dust suppressant chemicals. Time the application of dust suppressants to avoid or minimize their wash-off by rainfall or human activity. •Apply stormwater containment to prevent the conveyance of sediment into storm drains or receiving waters. •Protect inlets/catch basins during application of dust suppressants. •Street gutters, sidewalks, driveways, and other paved surfaces in the immediate area of the activity must be swept regularly to collect and properly dispose of dust, dirt, loose debris, and garbage. •Install catch basin filter socks on site and in surrounding catch basins to collect sediment and debris. Maintain the filters regularly to prevent plugging.
STRUCTURAL BMPs
N/A
TREATMENT BMPs
N/A

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STORMWATER POLLUTION SOURCE CONTROL WORKSHEET

List All BMPs to be used at site. Use one worksheet for each activity from the checklist.

Project: Lift Station 3 Replacement Activity: S411 - Landscaping, Lawn, and Vegetation Maintenance

OPERATIONAL BMPs
Do not dispose of collected vegetation into waterways or storm sewer systems Do not blow vegetation or other debris into the drainage system Dispose of collected vegetation by composting or recycling as appropriate. Remove, bag, and dispose of Class A and B noxious weeds in the garbage immediately. Do not compost noxious weeds. Use manual or mechanical methods of vegetation removal rather than applying herbicides, where practical. Use at least an eight-inch "topsoil" layer with at least eight percent organic matter to provide sufficient vegetation-growing medium.
STRUCTURAL BMPs
Install engineered soil/landscape systems to improve the infiltration and regulation of stormwater in landscaped areas. select the right plants for the planting location based on proposed use, available maintenance, soil conditions, sun exposure, water availability, height, sight factors, and space available.
TREATMENT BMPs
N/A

CITY OF LACEY

STORMWATER POLLUTION SOURCE CONTROL WORKSHEET

List All BMPs to be used at site. Use one worksheet for each activity from the checklist.

Project: Lift Station 3 Replacement Activity: S415 - Maintenance of Public and Private Utility Corridors and Facilities

OPERATIONAL BMPs
•Minimize the amount of herbicides and other pesticides used to maintain access roads and facilities. •Comply with WSDA Pesticide Regulations. •Provide maintenance practices to prevent stormwater from accumulating and draining across and/or onto roadways.
STRUCTURAL BMPs
•Stabilize access roads or areas of bare ground with gravel, crushed rock, or another method to prevent erosion. Use and manage vegetation to minimize bare ground/soils that may be susceptible to erosion
TREATMENT BMPs
N/A

CITY OF LACEY

STORMWATER POLLUTION SOURCE CONTROL WORKSHEET

List All BMPs to be used at site. Use one worksheet for each activity from the checklist.

Project: Lift Station 3 Replacement

Activity: S417 - Maintenance of Stormwater Drainage and Treatment Systems

OPERATIONAL BMPs
•Inspect and clean treatment BMPs, conveyance systems, and catch basins as needed, and determine necessary O&M improvements. •Promptly repair any deterioration threatening the structural integrity of stormwater facilities. •Properly dispose of all solids, polluted material, and stagnant water collected through system cleaning.
STRUCTURAL BMPs
N/A
TREATMENT BMPs
N/A

CITY OF LACEY

STORMWATER POLLUTION SOURCE CONTROL WORKSHEET

List All BMPs to be used at site. Use one worksheet for each activity from the checklist.

Project: Lift Station 3 Replacement Activity: S421 - Parking and Storage of Vehicles and Equipment

OPERATIONAL BMPs
•Do not hose down the area to a storm sewer or receiving water. Vacuum sweep parking lots, storage areas, and driveways regularly to collect dirt, waste, and debris. Mechanical or hand sweeping may be necessary for areas where a vacuum sweeper cannot reach. •Clean up vehicle and equipment fluid drips and spills immediately. •Place drip pans below leaking vehicles (including inoperative vehicles and equipment) in a manner that catches leaks or spills, including employee vehicles. Drip pans must be managed to prevent overfilling and the contents disposed of properly.
STRUCTURAL BMPs
N/A
TREATMENT BMPs
N/A

CITY OF LACEY

STORMWATER POLLUTION SOURCE CONTROL WORKSHEET

List All BMPs to be used at site. Use one worksheet for each activity from the checklist.

Project: Lift Station 3 Replacement Activity: S428 - Storage of Liquids in Permanent Aboveground Storage Tanks

OPERATIONAL BMPs
•Inspect the tank containment areas regularly for leaks/spills, cracks, corrosion, etc. to identify problem components such as fittings, pipe connections, and valves. •Place adequately sized drip pans beneath all mounted taps and drip/spill locations during filling/unloading of tanks. Operators may need valved drain tubing in mounted drip pans. •Vacuum sweep and clean the tank storage area regularly, if paved. •Replace or repair tanks that are leaking, corroded, or otherwise deteriorating. •Storage of flammable, ignitable, and reactive chemicals and materials must comply with the stricter of local zoning codes, local fire codes, the Uniform Fire Code (UFC), UFC standards, or the National Electric Code.
STRUCTURAL BMPs
•Locate permanent tanks in impervious secondary containment surrounded by dikes •Slope the secondary containment to drain to a normally closed valve, for the collection of small spills. •Include a tank overfill protection system to minimize the risk of spillage during loading.
TREATMENT BMPs
N/A

CITY OF LACEY

STORMWATER POLLUTION SOURCE CONTROL WORKSHEET

List All BMPs to be used at site. Use one worksheet for each activity from the checklist.

Project: Lift Station 3 Replacement Activity: S450 - Irrigation

OPERATIONAL BMPs
•Irrigate with the minimum amount of water needed. Never water at rates that exceed the infiltration rate of the soil. •Maintain all irrigation systems so that irrigation water is applied evenly and where it is needed. •Ensure sprinkler systems do not overspray vegetated areas resulting in excess water discharging into the drainage system. •Inspect irrigated areas for excess watering. Adjust watering times and schedules to ensure that the appropriate amount of water is being used to minimize runoff. Consider factors such as soil structure, grade, time of year, and type of plant material in determining the proper amounts of water for a specific area. •Inspect irrigated areas regularly for signs of erosion and / or discharge. •Place sprinkler systems appropriately so that water is not being sprayed on impervious surfaces instead of vegetation. •Repair broken or leaking sprinkler nozzles as soon as possible. •Appropriately irrigate lawns based on the species planted, the available water holding capacity of the soil, and the efficiency of the irrigation system. •Do not irrigate plants during or immediately after fertilizer application. The longer the period between fertilizer application and irrigation, the less fertilizer runoff occurs. •Do not irrigate plants during or immediately after pesticide application. •Reduce frequency and / or intensity of watering as appropriate for the wet season. •Place irrigation systems to ensure that plants receive water where they need it.
STRUCTURAL BMPs
N/A
TREATMENT BMPs
N/A

CITY OF LACEY

STORMWATER POLLUTION SOURCE CONTROL WORKSHEET

List All BMPs to be used at site. Use one worksheet for each activity from the checklist.

Project: Lift Station 3 Replacement Activity: S410 - Correcting Illicit Discharges to Storm Drains

OPERATIONAL BMPs
For all real properties, responsible parties must examine their plumbing systems to identify any potential illicit discharges. If an illicit discharge is suspected, trace the source using an appropriate method performed by qualified personnel. If illicit connections are found, permanently plug or disconnect the connections.
STRUCTURAL BMPs
N/A
TREATMENT BMPs
N/A

CITY OF LACEY

STORMWATER POLLUTION SOURCE CONTROL WORKSHEET

List All BMPs to be used at site. Use one worksheet for each activity from the checklist.

Project: Lift Station 3 Replacement Activity: S453 - Formation of a Pollution Prevention Team

OPERATIONAL BMPs
The pollution prevention team should be responsible for implementing and maintaining all BMPs and treatment for the site. This team should be able to address any corrective actions needed on site to mitigate potential stormwater contamination. the team members should: •Consist of those people who are familiar with the facility and its operations. •Possess the knowledge and skills to assess conditions and activities that could impact stormwater quality at your facility, and who can evaluate the effectiveness of control measures. •Assign pollution prevention team staff to be on duty on a daily basis to cover applicable permittee facilities when those facilities are in operation. •Have the primary responsibility for developing and overseeing facility activities necessary to comply with stormwater requirements. •Have access to all applicable permit, monitoring, SWPPP, and other records. •Be trained in the operation, maintenance and inspections of all BMPs and reporting procedures. •Establish responsibilities for inspections, operation, maintenance, and emergencies. •Regularly meet to review overall facility operations and BMP effectiveness.
STRUCTURAL BMPs
N/A
TREATMENT BMPs
N/A

CITY OF LACEY

STORMWATER POLLUTION SOURCE CONTROL WORKSHEET

List All BMPs to be used at site. Use one worksheet for each activity from the checklist.

Project: Lift Station 3 Replacement Activity: S454 - Preventative Maintenance and Good Housekeeping

OPERATIONAL BMPs
•Prevent the discharge of unpermitted liquid or solid wastes, process wastewater, and sewage to ground or surface water, or to storm drains that discharge to surface water, or to the ground. Direct contaminated stormwater from such an area to a sanitary sewer where allowed by local sewer authority, or to other approved treatment. •Promptly contain and clean up solid and liquid pollutant leaks and spills including oils, solvents, fuels, and dust from manufacturing operations on an exposed soil, vegetation, or paved area. • If a contaminated surface must be pressure washed, collect the resulting washwater for proper disposal. •Sweep all appropriate surfaces with vacuum sweepers quarterly, or more frequently as needed, for the collection and disposal of dust and debris that could contaminate stormwater. Use mechanical sweepers, and manual sweeping as necessary to access areas that a vacuum sweeper can't reach to ensure that all surface contaminants are routinely removed. •Construct impervious areas that are compatible with the materials handled. Portland cement concrete, asphalt, or equivalent material may be considered. •Use drip pans to collect leaks and spills from industrial/commercial equipment such as cranes at ship/boat building and repair facilities, log stackers, industrial parts, trucks and other vehicles stored outside. •For the storage of liquids use containers, such as steel and plastic drums, that are rigid and durable, corrosion resistant to the weather and fluid content, non-absorbent, water tight, rodent-proof, and equipped with a close fitting cover. •Promptly repair or replace all substantially cracked or otherwise damaged paved secondary containment, high-intensity parking, and any other drainage areas, subjected to pollutant material leaks or spills. Promptly repair or replace all leaking connections, pipes, hoses, valves, etc., which can contaminate stormwater.
TREATMENT BMPs
N/A

CITY OF LACEY

STORMWATER POLLUTION SOURCE CONTROL WORKSHEET

List All BMPs to be used at site. Use one worksheet for each activity from the checklist.

Project: Lift Station 3 Replacement Activity: S455 - Spill Prevention and Cleanup

OPERATIONAL BMPs
•Clearly label or mark all containers that contain potential pollutants. •Store and transport liquid materials in appropriate containers with tight-fitting lids. •Place drip pans underneath all containers, fittings, valves, and where materials are likely to spill or leak. •Train employees on the safe techniques for handling materials used on the site and to check for leaks and spills. •Develop and implement a spill plan and update it annually or whenever there is a change in activities or staff responsible for spill cleanup. Post a written summary of the plan at areas with a high potential for spills, such as loading docks, product storage areas, waste storage areas, and near a phone. •Provide a site plan showing the locations of storage areas for chemicals, inlets/catch basins, spill kits and other relevant infrastructure or materials information. •Describe the emergency cleanup and disposal procedures. Note the location of all spill kits in the spill plan. •List the names and telephone numbers of public agencies to contact in the event of a spill. •Store all cleanup kits near areas with a high potential for spills so that they are easily accessible in the event of a spill. The contents of the spill kit must be appropriate to the types and quantities of materials stored or otherwise used at the facility, and refilled when the materials are used. Spill kits must be located within 25 feet of all fueling/fuel transfer areas, including on-board mobile fuel trucks. •Implement the spill plan immediately.
TREATMENT BMPs
N/A

CITY OF LACEY

STORMWATER POLLUTION SOURCE CONTROL WORKSHEET

List All BMPs to be used at site. Use one worksheet for each activity from the checklist.

Project: Lift Station 3 Replacement Activity: S456 - Employee Training

OPERATIONAL BMPs
Train all employees that work in pollutant source areas about the following topics: •Identifying Pollution Prevention Team Members. •Identifying pollutant sources. •Understanding pollutant control measures. •Spill prevention and response. •Emergency response procedures. •Handling practices that are environmentally acceptable. Particularly those related to vehicle/equipment liquids such as fuels, and vehicle/equipment cleaning
STRUCTURAL BMPs
N/A
TREATMENT BMPs
N/A

CITY OF LACEY

STORMWATER POLLUTION SOURCE CONTROL WORKSHEET

List All BMPs to be used at site. Use one worksheet for each activity from the checklist.

Project: Lift Station 3 Replacement Activity: S457 - Inspections

OPERATIONAL BMPs
Qualified personnel shall conduct inspections monthly. Make and maintain a record of each inspection on-site. The following requirements apply to inspections: •Be conducted by someone familiar with the facility's site, operations, and BMPs. •Verify the accuracy of the pollutant source descriptions in the SWPPP. •Assess all BMPs that have been implemented for effectiveness and needed maintenance and locate areas where additional BMPs are needed. •Reflect current conditions on the site. •Include written observations of the presence of floating materials, suspended solids, oil and grease, discoloration, turbidity and odor in the stormwater discharges; in outside vehicle maintenance/repair; and liquid handling, and storage areas. In areas where acid or alkaline materials are handled or stored use a simple litmus or pH paper to identify those types of stormwater contaminants where needed. •Eliminate or obtain a permit for unpermitted non-stormwater discharges to storm drains or receiving waters, such as process wastewater and vehicle/equipment washwater. •Identify actions to address inspection deficiencies.
STRUCTURAL BMPs
N/A
TREATMENT BMPs
N/A

CITY OF LACEY

STORMWATER POLLUTION SOURCE CONTROL WORKSHEET

List All BMPs to be used at site. Use one worksheet for each activity from the checklist.

Project: Lift Station 3 Replacement Activity: S458 - Record Keeping

OPERATIONAL BMPs
See the applicable permit for specific record-keeping requirements and retention schedules for the following reports. At a minimum, retain the following reports for five years: •Inspection reports which should include: ◦Time and date of the inspection ◦Locations inspected ◦Statement on status of compliance with the permit ◦Summary report of any remediation activities required ◦Name, title, and signature of person conducting the inspection
STRUCTURAL BMPs
N/A
TREATMENT BMPs
N/A